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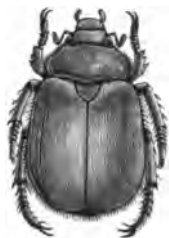








THE CANADIAN  
ENTOMOLOGIST.  
VOLUME XXIV.



EDITED BY THE  
Rev. C. J. S. Bethune, M. A., D. C. L.,  
PORT HOPE, ONTARIO.

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REV. C. J. S. BETHUNE.

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## EXCHANGE.

*Subscribers are invited to make liberal use of this column. Notices over three lines are liable to be shortened if necessary. All insertions free to subscribers.*

AMBLYCHILA CYLINDRIFORMIS wanted in exchange for *Cicindela unipunctata*, *Cychrus viduus*, etc. EDW. A. KLAGES, Crafton, Pa.

COLEOPTERA AND LEPIDOPTERA of Europe, Algeria, West Africa, Madagascar, India, etc., in exchange for N. American Coleoptera, mounted, or in sawdust or paper. L. ROSSIGNOL, 6 Rue Claude Vellefaux, Paris, France.

COLIAS BEHRIL.—Next June I expect to collect specimens of this butterfly for sale or exchange. JOHN B. LEMBERT, Yosemite Valley, Cal.

COLEOPTERA—I have about 1,500 species in duplicate and solicit exchanges, especially in Chrysomelidæ. CHARLES W. LANG, P. O. Box 3565, New York.

THERINÆ FERVIDARIA.—The undersigned will be very grateful to any entomologist who will send him eggs of the above-named Geometer. Having bred *Ellopiæ somnaria*, Hulst, through all its stages I am anxious to compare the two forms. J. FLETCHER, Central Experimental Farm, Ottawa.

WANTED TO PURCHASE OR EXCHANGE.—Good fresh specimens of Canadian Diurnal Lepidoptera, especially from west and north. H. J. ELWES, Preston, Cirencester, Eng.

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SPIDERS.—I wish to obtain American Spiders, and will exchange or name and return duplicate species. NATHAN BANKS, Sea Cliff, Queen's Co., N. Y.

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LEPIDOPTERA.—I wish to buy or exchange, live cocoons and pupæ of *Platysamia ceanothi*, *P. gloveri*, *Citheronia regalis*, and other species; also, larvæ of *Apatura cellis*, if not too late. ALFRED WAILLY, Tudor Villa, Norbiton, England.

A few live cocoons of the very rare *Samia columbia*, Sm., in exchange for other rare species; eggs or cocoons preferred. Also set specimens of N. A. Lepidoptera. List exchanged. EMILY L. MORTON, Newburgh, N. Y., New Windsor Delivery.

COLEOPTERA.—Exotic and European Coleoptera all named, for *Cic. dorsalis*, *C. cimarona*, *C. hirticollis*, or any species of *Cic* from the Southern United States. Address, R. J. WEITH, Elkhart, Ind.

LEPIDOPTERA.—I wish to obtain specimens of *Chionobas Macconnii* and other butterflies local to Nepigon; also a number of the rarer Bombycidae *Heptaliæ* and *Noctuæ* of Canada. I am willing to purchase or to give liberal exchanges in butterflies of the U. States or any part of the world. B. NEUMOEGEN, 40 Exchange Place, New York.

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## ENTOMOLOGY FOR BEGINNERS—No. 2.

### THE NORTHERN MOLE-CRICKET (*Gryllotalpa borealis*, BURM.)

BY JAMES FLETCHER, OTTAWA, ONT.

Anyone finding the strange-looking insect shown at fig. 1 will at once recognize it as the Northern Mole-cricket. It is apparently an uncommon insect in Canada, and it is partly to ascertain from the readers of the CANADIAN ENTOMOLOGIST whether or not this is the case that I am writing these notes upon a specimen which I have had in confinement for some months. I have been trying for years to get living specimens, but only succeeded last autumn when I had a fine female sent to me by Mr. W. W. Hilborn, who had caught it in his garden at Leamington, in Essex County, Ont. A short time afterwards I received from the same locality, from Mr. G. H. Mills, a male, but this was unfortunately injured in transit and died the day after arrival. There is to my mind nothing more interesting than keeping insects alive and watching their habits. This, too, after a little experience, becomes an easy matter if their habits are considered. I cannot, however, say that my Mole-cricket has been a very entertaining pet owing to its subterranean and nocturnal habits. I prepared a home for it in a large glass jar, 8 inches in diameter, and filled to the depth of about a foot with light, rich, sandy loam. Upon this was placed a potato and a small sod of lawn grass. The potato and grass soon threw out vigorous roots which now reach to the bottom of the jar. In the soil were also placed some earth-worms, as the food of Mole-crickets (like that of the other members of the *Gryllidae*, or crickets to which it belongs) is of a mixed nature, and they are said to be particularly partial to earth-worms.

The name Mole-cricket is very appropriate for this insect, it is plainly a cricket, and at the same time its habits and even general appearance, but particularly the form and uses of its strong fore-legs, closely resemble those of the little mammal from which it takes its name. Our excellent



FIG. 1.

figure, which has been kindly lent by Prof. J. A. Lintner, shows the female natural size. The sexes differ very little. The male is slightly smaller. Westwood says :—"Indeed, as the females are destitute of an exerted ovipositor, it is only by a minute inspection of the veins of the wing covers that the sexes may be distinguished. The females in this family are not able to make a noise, the veins of their wing covers being more regularly disposed. The males are, moreover, distinguished by having eight ventral segments in the abdomen, whilst there are only seven in the females." (Mod. Class. I, 443). There is only one species of Mole-cricket recorded from Canada. It is of the form shown above, of velvety seal-brown colour, which is darkest on the thorax. The wing covers are greyish, with dark veins, and the true wings are white and folded together like a fan. They are much larger than would be imagined from their

small tail-like tips, which show beyond the wing covers on the back. The most remarkable feature of these insects is the strong fore-legs, with their expanded paw-like shanks, which bear four claw-like curved and hollowed projections at the lower edge ; two of these are jointed at the base, and are in fact claws. The feet consist of three joints, which are attached about the middle of what, by the shanks being twisted obliquely outwards, is now the outside instead of the lower side. They consist of three joints : the first and second are large and claw-like, the second the smaller but reaching almost as far as the tip of the first ; the third is very small indeed, and bears two weak true claws. The first two tarsal joints being of the shape described give great strength to the insect's "paw" when used for digging, for they lie right in front of the two articulated projections of the shank which fit closely to them, and the weak terminal joint lies between. The adaptability of these limbs for their required use is at once seen by the rapidity with which these insects dig down out of sight again when disturbed.

As stated above, Mole-crickets are nocturnal in their habits. They live in moist ground and near streams, where they sink their burrows some inches beneath the surface ; but also throw up little ridges as they burrow nearer the surface, like miniature mole-runs.

They have not the power of jumping highly developed like other crickets, but can swim with ease if they fall into water. Their little shining black eyes, velvety coats and flexible bodies recall strongly the appearance of the otter, particularly when emerging from the water or crawling over stones. On the whole these interesting creatures are the most mammal-like insects I have ever seen. They keep in their burrows the greater part of the time, and I have only been able to catch sight of my specimen by going in quickly at night with a light. They move backwards with almost as great ease as forwards, the two caudal bristles being evidently very sensitive, for which reason they were designated caudal antennæ by one writer. The song of the male is described as "a low, continued, rather pleasant trill, quite similar to that of the common toad, but more shrill."

In Europe the Mole-cricket is described as being very injurious in certain localities from eating the young roots of plants and burrowing amongst the roots. There seems to be as much controversy, however, with regard to it as there is amongst farmers as to whether the mole is an injurious animal or not. Dr. Ritzema Bos says those who think that the Mole cricket is only injurious by burrowing beneath plants make a great mistake. The methods suggested for destroying it, should it at any time occur in large numbers, are the destruction of the eggs, which are laid to the number of from 200 to 400, in chambers about six inches beneath the surface of the ground, or killing the adults by means of poisoned baits, as grated carrot or potato mixed with arsenical substances.

Dr. Lintner says, Rep. VI., p. 151: "A method recommended by Kollar and approved by Curtis, as probably the best where the insect **abounds**, is to dig pits in the ground in the autumn, of a foot in diameter and two or three feet deep, to be filled with horse-dung and covered with earth. At the first frost all the crickets will be attracted to and congregate in these pits for warmth, where they can be conveniently killed." I shall be glad to hear from any reader of the ENTOMOLOGIST who may find this insect in his neighborhood, and also for any definite information concerning the food and habits. My jar is well filled with roots, and I frequently put a piece of raw meat on the surface of the ground, but I cannot say that I have ever seen that either it or the roots were much eaten. The ground is burrowed in every direction by clean burrows about as large as an ordinary lead pencil, and the Mole-cricket may sometimes be seen at night moving about in these burrows apparently in good health and quite at home.



## TWO NEW ORTHOPTERA FROM INDIANA.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

LOCUSTIDÆ—XIPHIDIUM. Serville.

*Xiphidium Scudderi*, nov. sp.

Female.—Front and sides of head and body dark reddish-brown ; vertex, disk of pronotum and tegmina greenish-brown in life, (dull yellow after immersion in alcohol). A dark reddish-brown stripe extends from the front extremity of the fastigium to the posterior border of pronotum, and contrasts strongly with the general colour of vertex and disk of pronotum. Femora greenish-brown punctate with many dark brown impressions on their upper surface ; the tibiæ darker. Antennæ with the basal third reddish, the remainder fuscous.

The apex between the eyes rather broad, with the sides rounded ; the cone projecting strongly upward and forward and much more prominent, though narrower, than in *X. strictum*, Scudder.

The tegmina cover two-thirds of abdomen ; the wings are shorter, reaching to middle of abdomen. Ovipositor of excessive length, almost twice as long as body ; slender, and nearly straight until near the apex, where it is curved slightly upward. The posterior femora and tibiæ are also longer and more slender than is usual with members of the genus.

Measurements: ♀, length of body, 18 mm.; of antennæ, 52 mm.; of tegmina, 9.5 mm.; of wings, 7 mm.; of posterior femora, 16 mm.; of posterior tibiæ, 16 mm.; of ovipositor, 30 mm.

A dozen or more females of this striking species were taken from the margins of a large pond in Vigo County, Ind., on October 11th, 1891. Although in company with *Xiphidium strictum*, Scudder, and *X. brevipenne*, Scudder, yet it was at once noticeable on account of its dark glossy-brown colour and exceedingly long ovipositor. Careful search was made for the males, both then and two weeks later, when the pond was again visited, but none were found, and on the latter visit but one female was seen. Those taken were on the stems of the partially fallen rushes and sedges which filled the margins of the pond. When disturbed they gave two or three enormous leaps, and then moving rapidly for some little distance would endeavor to hide beneath the mass of fallen vegetation.

Since the above was in MSS., Mr. S. H. Scudder, in whose honour the species is named, and to whom specimens were sent, suggests that

McNeill's *Xiphidium* sp. ? , mentioned in PSYCHE, VI, 24, as being deformed and having the ovipositor two and a-half times as long as the body, may have been this species.

GRYLLIDÆ—APITHES = (HAPITHUS), Uhler.

*Apithes McNeillii*, nov. sp.

Female.—Front margin of pronotum of same width (3.5 mm.) as head, slightly incurved; posterior margin but little broader, truncate. Tegmina slightly exceeding the abdomen, entire at the tip, the dorsal field the longer. Wings extending 2.5 mm. beyond the tip of tegmina. Posterior femora stoutish, exceeding the abdomen. Posterior tibiæ of same length as the femora, armed with two slightly divergent rows of spines on lower face—eight on the inner margin and five on the outer, besides the three at the apex on either side, the middle one of which is twice as long as any of the others. Between each two of the larger spines in the outer row are two small ones, about one-fourth the length of the large ones. The basal joint of tarsus has also a row of five spines on either margin of its lower face, the apical pair of which are much the longer.

The top of head, disk of pronotum, and the tegmina, are covered with a fine soft pubescence, visible only with the hand lens. All the tibiæ and upper and lower borders of posterior femora more coarsely pubescent with yellow hairs.

General colour, after immersion in alcohol, a dull brownish-yellow. A dark brown stripe reaches from eye to posterior border of pronotum. The tegmina with a small brown spot at their base, and the vein separating the dorsal from the lateral field with a number of oblong dark spots; the cross-veinlets are also much darker than the ones running lengthwise, giving the dorsal field a checkered appearance. All the femora are rather thickly marked with small dark spots, those on the posterior pair being arranged in regular rows. Extreme tip of ovipositor black.

Length of body, 16 mm.; of antennæ, 42 mm.; of tegmina, 14.5 mm.; of posterior femora, 9 mm.; of ovipositor, 12 mm.

A single female, the type specimen, was taken October 21st, 1891, from the lower leaves of a golden rod, *Solidago latifolia*, L., which grew in a thick upland woods in Vigo County, Ind.

I have named the species in honour of Prof. Jerome McNeill, of Fayetteville, Arkansas, a well-known writer on Orthoptera, and my first instructor in entomology.

## SOME INDIANA ACRIDIDÆ.—II.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

Since my first paper on "Indiana Acrididæ," which was published in the ENTOMOLOGIST for April and May, 1891, was prepared, six additional species have been taken in Vigo County. Of these, one is new to science; a second has been known in the United States only from Florida and North Carolina; of a third, but one specimen, a female, has hitherto been recorded, and from it Dr. Thomas described the species; while a fourth has not before been taken west of New Jersey. With the habits and local distribution, as far as noted, of these six species, together with the description of three of them, the present paper deals.

The following works may be added to the list given in the preceding paper to which the synonymy refers:—

Comstock, J. H.—An Introduction to Entomology, I., 1888.

Fernald, C. H.—The Orthoptera of New England, 1888.

McNeill, Jerome—"A List of the Orthoptera of Illinois" in Psyche, April and May, 1891.

Scudder, S. H.—Boston Journal of Natural History, VII., No. III., 1862.

Thomas, Cyrus H.—In "U. S. Geological Survey of Montana and Adjacent Territory," 1871.

## ACRIDIDÆ.

## ACRIDINÆ.

## TRUXALINI.

## 1. LEPTY SMA MARGINICOLLIS, Serville.

*Opomala marginicollis*, Thomas, Syn. Acrid. N. A., 1873, 66, 196, 250 (note).

*Lepty sma marginicollis*, Scudder, Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 87.

*Lepty sma marginicolle*, Comstock, Introduction to Entomology, I., 1888, 111, fig. 102.

On October 11th, and again on the 24th, a number of specimens of this slender-bodied, graceful species were taken from the tall sedges and rushes which grew near the margin of a large pond in the river bottom of the southern part of Vigo Co. Its range has heretofore been supposed to be a strictly southern one, and Thomas, in the note, loc. cit., states

that it is doubtful if it really belongs to the U. S. fauna. Mr. S. H. Scudder has, however, since recorded it from Florida, and in a personal letter says that it has also been taken in North Carolina, but not farther north.

Its occurrence in numbers as far north as Central Indiana is therefore worthy of record, and can only be accounted for by the presence of the broad and sheltering valley of the Wabash, within the confines of which it finds a climate and vegetation congenial to its taste.

If its habits be the same elsewhere as in Indiana, the name "grass-hopper" is for it a misnomer, for here it is never seen on the grass or ground, and never hops when disturbed, but moves with a quick and noiseless flight for twenty or more feet, to a stem of sedge or rush, on which it alights. The instant it grasps the stem it dodges quickly around to the side opposite the intruder. Then, holding the stem firmly with its short front and middle legs, it draws its slender hind femora close up against the body, and folding the tibiae into position, hugs its support as closely as possible, and remains perfectly motionless. Its body is almost cylindrical, and being of the same general colour as the stalk of the plant on which it rests, it is almost impossible to detect it, unless one sees exactly where it alights. Eight times out of ten a person by approaching quietly can reach his hand about the plant stem and grasp the insect. Its habits excellently illustrate the so-called "protective mimicry" of form and colouring, as it always seems to choose a cylindrical object, and one similar to its own colour before alighting.

As the description given by Thomas, loc. cit., is the only one in American works of reference, and, moreover, is a very short and poor one, I append the following drawn from fresh specimens, and hope that collectors throughout the Northern States will be on the lookout for this interesting and peculiar species :—

Body very slender, sub-cylindrical. Antennæ short, somewhat ensiform. Vertex extending far forward in the form of an equilateral triangle, slightly sulcate on its anterior half. Face very oblique, median carina weak, narrowly sulcate for its entire length; lateral carinæ slight and straight. Pronotum almost cylindrical, slightly divergent on posterior half; median carina present, distinct only on posterior lobe; lateral carinæ obsolete. Prosternal spine short and rounded. Face, vertex, occiput, and disk and sides of pronotum densely punctured. Tegmina exceeding the abdomen by 3 to 5 mm. Wings equal to tegmina in male, slightly shorter in female. Posterior femora very slender, not reaching tip of abdomen. Anal cerci of male slender, tapering, and bent abruptly upward and forward near the base. Sub anal plate narrow, upturned and tapering to a point.

The ground colour is a fawn, unbroken except by a narrow, yellowish stripe, extending from the hind border of eye, along the lower edge of pronotum to coxa of hind

leg. In living specimens this line is bordered above by one of dark brown. When the insect is dried the brown fades and the tips of tegmina become darker. Length of body to tip of tegmina, male, 30 mm.; female, 37 mm., of antennæ, male, 8 mm.; female, 6 mm.; of tegmina, male, 20 mm., female, 26 mm.; of posterior femora, male, 14 mm., female, 17.5 mm.

## OEDIPODINI.

## 2. SPHARAGEMON BOLLI, Scudder.

*Spharagemon bolli*, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 469.

McNeill, "Orthop. of Ill.," Psyche, VI., 1891, 64.

*Dissosteira bolli*, Fern., Orth. of N. Eng., 1888, 43.

This species is much less common than *S. balteatum*, Scudd., but three specimens having been secured. It may be readily known from *balteatum* by the higher crest of the pronotum, by the general colour being darker, the bands across the tegmina more distinct, and by having the tip of wing as black as the median arcuate band. It frequents high, dry woods, and moves with a quick, almost noiseless flight, but is clumsy as a hopper.

Sept. 1st, Oct. 17th, in copulation.

## ACRIDINI.

## 3. MELANOPLUS GRISEUS, Thomas.

*Caloptenus griseus*, Thos., Geol. Surv. Terr., 1871, 454.

Id., Syn. Acrid. N. A., 1873, 165.

A single ♂ of this handsome *Melanoplus* was taken in Putnam County, on August 25th. It hopped across a roadway in the woods in company with numerous specimens of *M. femur-rubrum*, and was at once detected on account of its peculiar coloration.

On October 17th, a ♂ and ♀ were taken from near the base of trees in a high woodland pasture in Vigo County, and again on November 15th a single female was found in a similar locality.

These four are all that I have ever seen. No one of them took to flight, and their movements on the ground were exceedingly clumsy, they being easily captured with the hand. As Thomas, loc. cit., described the species from a single ♀ taken in Ohio, and as I can find no reference to the species other than those cited above, I add the following description of the ♂, drawn from a fresh specimen, together with accurate measurements of both sexes.

The length of *M. femur-rubrum* but thicker bodied. Head rather large with the occiput elevated; eyes prominent. Vertex very narrow between the eyes; the fastigium deeply sulcate; foveola present but minute, their outline circular. Frontal ridge rather broad, sulcate at the ocellus, convex between the antennæ, punctate with black depressions along each margin for its full length. Lateral carinæ prominent, but little divergent. Pronotum nearly uniform in width, expanding slightly posteriorly; the median carina distinct only on the posterior lobe, and deeply cut by the three transverse sulci; posterior lobe punctate with dark impressions. Tegmina extending 5 mm. beyond the tip of abdomen; wings but little shorter. The terminal ventral segment turned up, narrow, acuminate, entire. The anal cerci are strongly bent upward near their middle, and bear on their lower edge a broad, triangular, wing-like expansion, the apex of which is opposite the bend.

Colour.—Face, occiput, and disk of pronotum a grayish-lilac with numerous fleckings of sooty black. A broad stripe of black starts from the eye and extends back along the upper side of pronotum to the posterior transverse sulcus. Tegmina grayish-olive, marked regularly over almost their entire surface with subquadrate fuscous spots which are much larger than those possessed by *femur-rubrum*. Wings transparent, tinged with pale yellow on basal third, the veins of apical fourth fuliginous. Three bands of black cross each femur and are alternated with bands of grayish-blue of the same width. Posterior tibiæ with the basal third red, the remainder gray with black spines; knees black; venter pale yellow, (alcohol changes the black to a reddish-brown, and the grayish hues to a dull yellow). Dimensions:—Length of body, ♂ 24 mm., ♀ 27 mm.; of tegmina, ♂ 20 mm., ♀ 22 mm.; of antennæ, ♂ 11 mm., ♀ 12 mm.; of posterior femora, ♂ 14 mm., ♀ 15 mm.

The peculiar mottled appearance, and the broad expansion of the anal cerci of the ♂, serve to distinguish this species from all other *Melanopli* of the E. U. S.

#### 4. PEZOTETTIX HOOSIERI, nov. sp.

Antennæ of ♂ very long, exceeding the length of posterior femora. Vertex between the eyes narrow, scarcely as broad as the basal joint of antennæ, (broader in the ♀), expanding and prominent in front of the eyes where it is broadly but shallowly sulcate; foveola about twice as long as wide, slightly narrowed in front, more prominent in the ♀. Frontal ridge rather broad, regular, scarcely if at all sulcate below the ocellus;

lateral carinæ well developed, but little divergent. Pronotum broadening slightly on posterior half, (more noticeable in the ♀); median carina distinct and equal throughout, the transverse sulci scarcely noticeable in the ♀, distinct but shallow in the ♂; the lateral carinæ present but rounded obtusely off; the disk and sides of posterior lobe densely and rather coarsely punctate. Tegmina oblong, two and a-half times as long as broad, reaching to middle of abdomen and slightly over-lapping on the median dorsal line, the wings but little shorter. Last ventral segment of the abdomen of ♂ broader than high, tumid posteriorly, the lateral edges higher and flaring slightly outwards. Cerci long and slender, gently incurved, narrowed at the middle, with the apical third flattened and slightly hollowed on the exterior face.

Colour of living specimens:—Male—Antennæ rufous, infuscated at tip, and with the apical sixth of each segment yellowish. Face green, clypeus and mouth parts yellow. Vertex, disk of pronotum and tegmina plain olive, immaculate. Lateral lobes of pronotum greenish-yellow below; above with a broad, shining, black line reaching from the eye to their posterior edge. The venter pale yellow, and the meta-pleural episterna with an oblique yellow line. Femora green; knees black; posterior tibiæ greenish, rufous at base, with black spines.

Female—Duller; the disk of pronotum and tegmina sometimes with minute fuscous spots; a black stripe on the sides of abdomen, above which are numerous small black blotches.

Measurements:—Length of body, ♂ 22 mm., ♀ 31 mm.; of antennæ, ♂ 15 mm., ♀ 11 mm.; of tegmina, ♂ 10 mm., ♀ 13 mm.; of hind femora, ♂ 14 mm., ♀ 17.5 mm. 13 ♂'s, 11 ♀'s.

About the margin of the pond above mentioned, this *Pezotettix* was found in numbers on October 17th. It was at once noticeable on account of the length of the male antennæ, and the black stripes on the sides of the abdomen of the female. The pond was almost dry, and the dense growth of sedges and rushes which had filled its shallow margins, were, in some places, burned away. Over the burned spots had sprung up a dense green vegetation, and here this *Pezotettix* flourished in company with *Truxalis brevicornis* and *Chrysochraon viridis*, while a few feet away *Leptysma marginicollis* found a suitable home amongst the rushes and sedges still standing.

Both sexes of *P. hoosieri* were very active, leaping vigorously when approached, and difficult to capture except by throwing the net over

them as they rested on the ground. The females were exceedingly difficult to kill in the cyanide bottle, "coming to" after having been kept in it for several hours, although the males and the other insects above mentioned were killed in a few minutes. On Oct. 27th the spot was again visited, and, although several heavy frosts had occurred, yet the species was still fairly common. At this time, however, they were all found in the small patches of grass which grew among the fallen leaves a few yards from the edges of the pond proper.

## TETTIGINÆ.

## 5. BATRACHIDEA CARINATA, Scudder.

*Batrachidea carinata*, Scudd., Bost. Jour. Nat. Hist., VII., 1862, 479.

Thos. Syn. Acrid. N. A., 1873, 190.

Fernald, Orth. N. E., 1888, 49.

*Tettix cristatus*, McNeill, Psyche, May, 1891, 77.

Two males of this species were taken, in company with numerous young and adults of *B. cristata*, Harris, from a grassy hillside on April 1st, 1891. Although Bolivar, according to McNeill, has made *carinata* a synonym of *cristata*, yet, in my opinion, the two are as distinct as are the two common species of *Tettigidea*. *Carinata* has the pronotum extending 3 mm., and the wings 4 mm. beyond the tip of abdomen, whereas *cristata* has the pronotum of the same length as the abdomen and the wings lacking 2 mm. of reaching its tip. Moreover, the median crest of the pronotum is not so prominent nor so strongly arched in *carinata* as in *cristata*. Length of pronotum of *cristata*, ♂ 7 mm.; of *carinata*, ♂ 9.5 mm. *Carinata* has not before been reported west of New Jersey.

## 6. TETRIX CUCULLATUS, Burm.

*Tettix cucullata*, Scudd., Bost. Jour. Nat. Hist., VII., 1862, 475.

Thos., Syn. Acrid. N. A., 1873, 185.

*Tettix cucullatus*, Fernald, Orth. N. E., 1888, 47.

McNeill, Psyche, VI., 1891, 77.

Several half-grown young and two adults of this species were taken on April 1st, and on Sept. 15th a large number of adults were secured. It appears to be widely distributed over the Eastern U. S., its occurrence having been observed from New England to Sherman, Texas, at which latter locality I took a number of specimens on July 11th. It is evidently a water-loving species, as those taken in Texas, and most of those secured



in Indiana, were found along the damp, sandy or muddy margins of small streams, in company with *Galgulus oculatus*, a common Hemipteron, which abounds in like situations. *Cucullatus*, when disturbed, has a more prolonged flight than any other of our *Tettiginae*.

The life-history of the "grouse locusts" is, as yet, very imperfectly known. In the proper localities mature specimens of most of the six species so far noted in Indiana can be taken almost any day in the year. *Tettix ornata*, Say, and *Tettigidea polymorpha*, Burm., were found in copulation on April 18th, and the latter species again on May 31st; while, as noted above, the half-grown young of two species were collected on April 1st.

\* \* \* \* \*

No. 18, *Pezotettix viridipes*? Walsh, Mss., of my first paper, is *Pezotettix viridulus*, Walsh, as I have since determined by comparison with specimens of the latter taken by Prof. McNeill at Moline, Ill. It was the third full-grown species, other than *Tettigina* taken last season, having been preceded by *Chortophaga viridifasciata*, De Geer, Apr. 26th, and *Arphia sulphureus*, Fab., May 20th. Two mature males of *P. viridulus* were taken on May 30th, and others were found at intervals throughout June, but it is by no means a common species in this locality.

## FURTHER NOTES ON GELECHIA GALLÆDIPLOPAPPI, AND DESCRIPTION OF A NEW SPECIES OF BRACON.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In a paper entitled "A Day in the Woods," I brought under the notice of the Entomological Society of Ontario, at its annual meeting held in London, on the 27th of August, 1890, the galls formed by *G. gallædiplopappi*, and gave an account of the chrysalis and perfect insect. I also alluded to two kinds of parasites preying upon the species. The description of the moth was reproduced in the December number of the CANADIAN ENTOMOLOGIST of that year (Vol. XXII., p. 248).

The insect has again come under my observation, and I am able to furnish these further particulars concerning it:—

The larva of the species when full grown is four lines in length. Its colour is light seal-brown, and it has a dorsal line of darker brown, and a few dark patches on the three last segments. Its head is black. There are a few bristles on the head and along the sides. It assumes the chrysalis form in the beginning of July.

The moths continue to appear from the 1st of August to the close of the month.

At least three kinds of parasites molest the species :—

1. *Pimpla pterelis*, Say, which, in August, issues in its perfect state from the chrysalis of the moth. (See 22nd Ann. Rep., Ent. Soc. of Ont., p. 18). This species was identified for me by Mr. Harrington.

2. An insect which, in its larval condition, leaves the chrysalis of the moth about the 10th of July. The larva is nearly four lines in length, and is white with a tinge of pink. It spins a white cocoon within the gall. I have two or three of the cocoons, and hope to obtain the perfect insects in due course.

3. A Bracon.—The larvæ of this, numbering from four to ten in a batch, consume the remains of their host at the end of July, and then spin their light drab cocoons in a cluster at the bottom of the gall. The flies appear about the 10th of April.

The perfect insect has the head and thorax black. The abdomen, which is somewhat spindle-shaped, and is attenuated at the junction with the thorax, is honey-yellow, with a brown patch on the upper part of each segment—in some instances the upper part of each segment is entirely suffused with brown. The mouth organs are honey-yellow, and the legs, with the exception of the tarsi of the hindmost pair, which are light brown, are of the same colour. The ovipositor of the female is longer than the abdomen. Its sheath is blunt, hairy and black at the tip, and does not divide in drying.

I cannot learn that this insect has hitherto been described or named. I would therefore suggest for it the appellation *Bracon furtivus*.

#### NOTES ON THE LIFE-HISTORY OF AGALLIA SANGUINOLENTA, PROV.\*

BY HERBERT OSBORN AND H. A. GOSSARD, AMES, IOWA.

This leaf-hopper is considered a clover pest, but is also known to feed on beets, rutabagas, cabbages and blue grass. It is active even in midwinter on sunshiny days. The eggs are thrust beneath the epidermis of the food-plant, and the first brood of larvæ appears from the middle of May until July 1st. The earliest individuals of the brood are nearly mature by the first of July and are supposed to begin egg-laying a little later. Larvæ can be found in all stages of growth from this time until the advent of winter, but most of the individuals are believed to be included in two broods.

## ON THE ORTHOPTEROUS FAUNA OF IOWA.\*

BY HERBERT OSBORN, AMES, IOWA.

The Preliminary List of the Orthoptera of Iowa, published by Prof. C. E. Bessey in the Seventh Biennial Report of the Iowa Agricultural College, is revised, a number of species being added and a number of names taken from incorrectly determined specimens rectified.

The revised list is represented thus in the following families :—

|                                             |                             |
|---------------------------------------------|-----------------------------|
|                                             | Family <i>Forficulidæ</i> . |
| One species.                                |                             |
|                                             | Family <i>Blattidæ</i> .    |
| Four species.                               |                             |
|                                             | Family <i>Phasmidæ</i> .    |
| One species.                                |                             |
|                                             | Family <i>Acrididæ</i> .    |
| Forty-one species.                          |                             |
|                                             | Family <i>Locustidæ</i> .   |
| Twenty-three species, probably twenty-four. |                             |
|                                             | Family <i>Gryllidæ</i> .    |
| Ten species.                                |                             |
| Total, eighty or eighty-one species.        |                             |

HOW THE FEMALE OF *CACOECIA SEMIFERANA* PROTECTS HER EGG-CLUSTERS.\*

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

The Box Elder Leafroller, *Cacoecia semiferana*, was very abundant in many places in Colorado last summer, and in July the moths were swarming in the trees in the evening, presumably to deposit their eggs. The eggs were found beneath a gluey mass, somewhat similar to that used by the tent caterpillar in protecting her eggs, but it was largely covered with what appeared to be scales from the moth, placed like the shingles on a roof. A careful examination of these shingled patches under the microscope makes it seem certain that the eggs are first all deposited, the glue is then added, and after this the abdomen is laid at full length in the sticky substance until it hardens, when the abdomen is removed, and the scales covering its under side are drawn and left covering the eggs.

\*Abstracts of entomological papers read before the Iowa Academy of the Sciences, Des Moines, Iowa, December 28 and 29, 1891.

## NOTES ON COLEOPTERA.—No. 9.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

*Philydrus*, CAN. ENT., XVI., 186.—The paragraph commencing with "*Philhydrus*" should be corrected as follows :—*Philydrus perplexus*, Lec., and *P. Hamiltoni*, Horn, are found [on Brigantine Beach] in the fresh water pools which form at the base of the sand-hills, with *Hydrophilus glaber* and *Copelatus glyphicus*; while *Philydrus reflexipennis* occurs in the salt marshes under pieces of wood and recent tide-drift, seeming to inhabit salt or very brackish water, as it has not been taken in fresh water with the species mentioned. When the paragraph was penned *P. Hamiltoni*, since described, was supposed to be *reflexipennis*, and the true *reflexipennis* a variety of *ochraceus*.

*Philydrus fimbriatus*, CAN. ENT., XX., 63.—The variety noticed as inhabiting hill and mountain rivulets has recently been described as a species, and is *Cymbiodyta Blanchardi*, Horn.

*Cercyon littoralis*, Gyll.—This nice species occurred very abundantly in September at Longport, near Atlantic City, New Jersey. It inhabits under the softer grass washed from the Bay deposited on sand flats, and which has remained there long enough for breeding purposes. Though represented as very variable in colour and markings, the only differences observed in several hundred individuals examined was that about one-half were entirely piceous black, while the remainder had the posterior fourth of the elytra pallid. *Cercyon* has heretofore been much neglected by most American collectors, but the genus having been recently monographed by an able hand, and the species defined by characters usually of easy observation, they are likely to become better known. All things considered, this species seems to be native in North America as well as in Europe. Here it has been taken on Magdalen Island, Gulf of St. Lawrence; Coney Island, New York; the New Jersey sea coast, and in Illinois (Horn, monograph). In Europe, skirting the Western Mediterranean shores, it follows the Atlantic Coast to N. Lat. 66° 50', and also occurs in Northern Asia on the shores of the Obi. The *Cercyons*, so far from being despicable, are very interesting beetles, and no genus of equal extent contains so many forms common to the Old and New Worlds. In fact, of the 25 American species monographed by Dr. Horn, 14 likewise occur in Europe.

*Trogophloeus convexulus*, Lec. — Several examples (it occurred abundantly) of this minute beetle were taken on the salt marshes near

Longport, New Jersey, in September. The identification is due to Mr. H. Ulke, confirmatory of a like diagnosis by myself. The most, or indeed all of the species of *Trogophloeus* which I have heretofore taken, occur wandering about in very wet places, taking refuge under leaves, sticks, &c.; but the present species differs in being found in places comparatively dry, and in constructing surface galleries like many of the species of *Bledius*, some of which it closely resembles. Dr. Leconte described the species from an individual from New York, and another from Kansas, which, till the present time, do not appear to have been duplicated. These two examples, measuring each .07 inch in length, represent the smallest individuals; the length of a number taken together averaging over .09 inch. There are no thoracic impressions whatever visible in the great majority of individuals, but occasionally one of the larger ones bears indistinct traces of the usual basal marks, barely discernible in certain lights. The smooth thoracic line is usually conspicuous, which, with the piceous or black antennæ and parti coloured feet, make this species of easy recognition. This species likewise occurred on Brigantine Beach, and may be looked for in the salt marshes anywhere along the Atlantic Coast.

*Callichroma splendidum*, Lec.—This well-known and highly-prized beetle is distributed along the Atlantic coast from Delaware to Key West, Florida, around the Gulf of Mexico to Southwestern Texas, and northward along the Mississippi to Arkansas. It is known to breed in the trunk and immense roots of a tree growing in the Southern swamps, especially in such as sustain Cypress, and is known in different places by such names as Sour Tupelo, Large Tupelo, Wild Olive, Wild Lime, Gum-Elastic Tree, &c., being the *Nyssa uniflora*, Walt., congeneric with *N. multiflora*, Weng., the abundant and well-known Gum Tree, or Pepperidge, common in many of the Northern States. The leaves and fruit of this tree, with several of its brilliant inhabitants, were recently received from Alabama, by which I am able to confirm the one or two observed records of its larval habits. It may, however, breed in other species of trees, as the first example in my collection was presented by a young naval surgeon, who took it on Key West, Florida, a place where *Nyssa* probably does not grow. The individuals of this species vary considerably in size, the sculpture of the thorax, and the colour of the elytra. An individual from Delaware measures .85 inch in length; the one from Key West and another from Texas 1.70 inch each, but the average

appears to be near 1.30 inch. The colour of the thorax is uniformly a brilliant fiery copper, with green reflections when seen after night or in certain lights, and is a specific character; the thorax differs in individuals from being deeply rugous to comparatively smooth, and in the prominence of the lateral spines and tuberosities. The elytra in the large majority are deep sericeous green, but in some examples, more or less shot with copper, which in some individuals becomes the prevailing colour, known in some collections as *virescens*.

Some time ago I had an opportunity to examine several examples of each of two species of *Callichroma* taken in Cuba, one of which, labelled *columbina*, Dej., seems only to differ from *splendidum* by having the thorax colored coppery bluish or violet; if other differences exist they escaped observation.

This species was described very briefly by Dr. Leconte under Dejean's catalogue name *splendidum*, with *Cerambyx elegans*, Fab., Oliv., Hald., in synonymy (Jour. Acad. Nat. Sci., Phil., 2d Ser., II., 37). Dr. Asa Fitch, however, states (Rep. 4, 711,) that Linnæus had previously described it under the name *suaveolens*, from an example sent him from Carolina by Dr. Garden. (Appendix to last Ed. Syst. Nat., III., 224, 1770.) At one time this species was considered an inhabitant of the West India Islands, being probably mistaken for *columbina* or some allied species. In fact, some of the species of *Callichroma*, of which I have seen nine, are uncomfortably close, and separated by characters which, in many genera, are of little moment.

*C. plicatum*, Lec., is strikingly like *splendidum*, but the green colour of the head and thorax is constant and devoid of any coppery reflections. The habits of the two species, if I am rightly informed, are more confirmatory of their being specifically different than anything yet observed in their external structural characters. A friend (not an entomologist), from Hamilton County, Central Texas, says this species breeds in old cactus. While requiring further confirmation, this statement is probably correct, from the fact that there has been no record observed of its having been taken in swamps with *splendidum*, and from the fact that it occurs only in cactus regions in Texas to Arizona, where it was taken near the south-eastern boundary at Camp Bowie. (Wheeler's Reports on Exp. and Surv., Vol. V., Zoology, p. 821.)

*Eupogonius tomentosus*, Hald.—Here this species is not common;

till recently all the examples in my collection were bred from dead hickory limbs (once). All other observed records of its habits represent it as inhabiting in its early stages pines. This is with scarcely a doubt the species Dr. Fitch describes under the name "*E. pinivora*, Pine-eating Gay-beard" (Rep. iv., 712), which he says differs from *E. tomentosus* by the erect hairs on the body and antennæ being black, a different form of spots on the elytra and the smaller size. The last two are of no value, as the length of *tomentosus* varies from .20 inch to .33 inch, and the elytra from having scarcely perceptible patches of pubescence to the high ornamentation of Dr. Fitch's *pinivora*, while the black colour of the erect hairs was very probably an optical deception, from a perhaps careless comparison of bright fresh examples with older faded ones; any one who has the insect can readily see how this might occur, by examining a specimen after night, or by a dull light. This species is distributed from Florida to Canada, occurring in New York and Michigan. The locality from which the hickory limbs from which my examples were bred were obtained is remote from any place growing pine, and the occurrence can scarcely be regarded as fortuitous. *E. vestitus* is very commonly bred here from hickory.

*Elleschus*, CAN. ENT., XVI., 106.—The *Elleschus bipunctatus*, mentioned at the place cited, proves to be one of the forms of *E. scanicus*, Payk., as determined by Dr. W. G. Dietz on comparison with authenticated European examples. The colour and the elytral markings of this species seem to be locally variable, and in the present instance scarcely or not differing from those of *bipunctatus*. This form has been sent me from Europe as *bipunctatus*, but an examination of the structural characters shows it to be the same as my American form. The typical form of Paykull was rufo-testaceous with fasciate elytra, and a similar form was taken by Dr. Dietz at Hazleton, Pennsylvania, from which a redescription of the species was made and a figure drawn (Tr. Am. Ent. Soc., 18, 264, plate vii., fig. 35, 35a). As he had not then seen this form it is not mentioned in Dr. Dietz's excellent paper, and from his description and figure of the species it would not be readily recognized as the same. Some individuals have no markings whatever, not even a trace, and all others have, more or less visible, the small spot on the disk of the elytra before mentioned, any others being attributable to abrasion. The colour varies from piceous to pale. This species is only known from here, and at Hazleton certainly. Common throughout Europe on willow.

Dr. Dietz records *E. bipunctatus* as occurring in Canada ; Hubbard and Schwarz, in Northern Michigan.

*Anthonomus musculus*, Say, and *A. signatus*, Say.—In 1831 Say published in his *Curculio*, p. 15, a description of *A. musculus*, and on p. 25 that of *A. signatus*, and from the descriptions it is evident he had before him two distinct species. In Leconte and Horn's *Rhyncophora*, a species is assigned to each name separated by definite characters ; and in Dr. W. G. Dietz's elaborate revision of the tribe lately published, these are still more clearly defined. One of these species is of economic importance, being occasionally exceedingly destructive to the cultivated strawberry. Owing to the difficulties encountered in attempting to separate them, some economic entomologists now solve the matter by uniting the species, unfortunately, under the name of the one having typographical precedence—*musculus*. Prof. C. V. Riley devotes several pages in one of the Government agricultural reports (1885, p. 276–282,) to the discussion.

The true *musculus* is not very common here, and is usually found in colonies on huckleberry blossoms—I have never taken a specimen on anything else—and occurs here from the middle of May till the first of June. Whole acres may be hunted over without obtaining a single specimen. The individuals seem to vary only from degrees of maturity, Say's description having been drawn from examples recently disclosed, while his variety is the more mature. *A. signatus*, on the other hand, is protean in colour and elytral ornamentation, so much so that judged by this alone it might be divided into several species. It appears about the first of June, and may be found more or less abundantly all summer. It eats the leaves and blossoms of many species of trees and shrubs. I have taken it abundantly on *Tilea* and *Rhus*, and it seems to have a decided taste for certain *Rosacæ*—notably, *Rubus*.

Diligent search has several times been made in the fields of the cultivated strawberry without finding any *Anthonomus*, and efforts to obtain the strawberry form from correspondents have equally failed. *A. signatus*, however, is often seen on the leaves of the wild strawberry, through which it eats holes like it does to the leaves of *Rubus*. Both species may possibly depredate in strawberry plantations, but it would be a wide departure for the true *musculus* from any of its known habits.

From the unanimity of systematists in maintaining the distinctness of the species, it will be necessary for economic entomologists, if they care



for accuracy, to make further investigation and ascertain which it is by which the mischief is done, or whether both species may not be concerned in different places. There will be little trouble in doing this, provided the huckleberry insect can be found with which to make the comparison, as they are only moderately difficult to separate when both forms are at hand.

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## NOTES ON THE ÆGERIADÆ OF CENTRAL OHIO.

BY D. S. KELLICOTT, COLUMBUS, OHIO.

The Lepidopterous family to which these notes pertain is a homogeneous and distinct one, clearly and sufficiently separated from other families. The larvæ, so far as known, are borers in roots, stems, branches, or excrescences of trees, shrubs or annuals, yet all strictly retain the structure and appearance of the young of their order. Most of them pass the winter buried in the food plant. A few, however, hibernate as pupæ or as larvæ, protected by cocoons. The most remarkable variation of the adolescent period is in the variable length of time from egg to pupa. Certain wood-boring species, *Harmonia pini* for example, pupate and disclose the imago the third year from the egg; others complete their changes in a few weeks. The pupæ are quite similar. The clypeus is usually armed with a protuberance, and the abdominal rings with transverse rows of spines, agreeing in this respect with normal pupæ of Tortricidæ, Cossidæ and Hepialidæ.

The moths are among the most beautiful of insects, and in other ways they are no less attractive. Their exquisite form, coloration and gracefulness of motion appeal to every one permitted to see them, but the highest enjoyment is reserved for those who appreciate the extent and exactness of *protective mimicry* exhibited by these insects. So intimately do they simulate the appearance, aided many times by sounds, odours and attitudes of wasps and bees, that the very elect in entomology are often deceived and cheated. Again, their habits render many of them grave pests, compelling attention from horticulturist and economic entomologist.

In spite of these reasons, and more that might be alleged for their collection and study, they are not well represented in collections. In fact, in a majority of collections which I have had the pleasure to examine Ægeriadæ, like Odonata, are few and ill-favoured. This is to be regretted; but since we have the material in abundance, the defects may

and will be remedied. The situation is relieved somewhat by the thought that there is certainly one unique collection of the *Ægerians* in this country, namely, that of the late Henry Edwards. What disposition is to be made of it I know not. Perhaps no one does. All sincerely hope that it may speedily find a safe resting-place, accessible to the interested student, and where it will be properly cared for, and will duly honour our foremost student of this group.

The list of species of this family thus far collected at Columbus, I am aware, is only a partial one—one which it is hoped may be greatly increased in the near future. Such facts as are at hand, it is hoped, will prove interesting and suggestive. I follow the generic arrangement of Henry Edwards in Grote's Check List of N. A. Lepidoptera.

*Melittia ceto*, West., (*cucurbitæ*, Harris).—The squash-borer occurs abundantly in Central Ohio, and, indeed, throughout the State. In localities where cucurbitaceous plants are cultivated on a commercial scale it is a veritable pest. Is it double brooded? Since Dr. Harris's account of its habits more than sixty years ago, it has been regarded as single brooded, the moth appearing in early summer, the mature larva entering the soil in July and August, enclosing itself in a gummy cocoon in which it remains until the following spring, when it completes its transformations. During the last days of August Prof. F. M. Webster and myself found in squash vines on the Ohio Agricultural Experiment Station Farm larvæ of different sizes; a few inches below the surface cocoons containing larvæ were found, and one fresh imago was taken resting on the leaves. By September 20 all the larvæ were out of the stems and could be found in their dark, oblong cocoons from two to four inches beneath the surface. My friend Webster asked me if the species was two-brooded. I replied by asking him the same question. At the time I did not recall the paper by Prof. S. H. Scudder in *Psyche*, vol. iv., p. 303, in which he recounts finding in squash vines on Cape Cod in September two larvæ, one much larger than the other and apparently specifically distinct. He describes each and raises the question, Is *M. ceto* double brooded or are there two species passing under that name? Only the larger forms found by the writer were preserved and carefully examined; they were typical *Melittia ceto*. The single imago was likewise a typical example of that species. It seems probable from the facts at hand that in Central Ohio and South the species is double brooded.

*Alcathoe caudatum*, Harris.—This unique species is the sole representative of its genus. It was described by Harris in vol. xxxvi. of Silliman's Journal. His description has been copied by many authors and nothing added. This is evidently due to the fact that the insect is rare. A number of working entomologists have assured me that they had never taken it. The latter part of August, 1889, three examples were seen by me visiting blossoms of *Mileolotus* on the Ohio State University grounds; two males were captured, the third, a female, escaped.

Harris describes the forewings of the male as "transparent from the base to the middle." In both of my specimens there are only clear streaks, one on either side of the median vein; indeed, when first taken these lines were scarcely perceptible. The coxæ and femora are black; tibiæ orange, with more or less perfect black rings at base and apex of second and third; tarsi tawny orange, with first joint of last pair surrounded by a heavy band of orange hairs and a few black ones outwardly at the base; the palpi are light, bright orange below, darker above, whilst the antennæ are of the same shade as the upper surface of the palpi, but having the double row of fringes blackish. The caudal appendage, which is fully as long as the abdomen, is bright orange; the caudal tufts are black and orange. Harris gave the black currant as the larval food-plant. Henry Edwards, in 'Transformations of N. A. Lepidoptera', mentions the stems of *Clematis* also. I have not been able to find the larva in either of these plants.

*Bembecia marginata*, Harris.—This species occurs everywhere about Columbus in the native blackberry. Thus far I have not heard that it has given trouble to the cultivator. The moths may be taken in September resting on the foliage of plants near the food of the larva.

*Podosesia syringæ*, Harris.—As the specific name implies the larval food-plant is the lilac. If it would confine its attention to this old-fashioned ornament of lawn and garden it would have far less economic interest. But, unfortunately, it attacks and destroys the white and the European ash, as well as the mountain ash, *Pyrus Americana*. Large numbers of them were found in the trunks of the last in April, 1891; several trees on the Ohio State University campus were found greatly damaged by them. It may, therefore, yet be found to injure other and more valuable rosaceous trees in cultivation.

*Sannina exitiosa*, Say.—The Ægerian peach-tree borer is far too abundant wherever the peach is cultivated. Central Ohio is not an exception.

*Ægeria gallivora*, West.—In May last I obtained from a globular excrescence on an oak twig three *Ægerians*—one male and two females. They were at first taken to be *Ægeria hospes*, Walsh, until a careful comparison was made with the original description of that species in vol. vi., p. 270, of the Proceedings of the Entomological Society of Philadelphia, when I found good evidence that the moths were not of that species. The following characters seem to afford sufficient grounds for this conclusion:—1. They were larger, expanse .75 inch (*Hospes* .57 inch); 2. there is a well-marked black band at tip of hind tibiæ, in the female as wide as half the length of the joint, or the whole space distal of the middle spurs (*Hospes* has the tibiæ tipped with blackish only); 3. the second abdominal band of female is broad and the yellow ventral patch much longer and more clearly defined than in the male (according to Walsh, this band is not broad and the spot is only half as long as in the male); 4. the expanse of *Hospes* female is .50 inch, of these .75 inch; 5. and again, these have a yellow collar and the first joint of the antennæ maculate in both sexes, whilst the female *Hospes* has the first antennal joint immaculate (Walsh).

Are these moths Westwood's *Trochilium gallivora*? His description is inadequate, and without a comparison with the type there must always remain some uncertainty. Nevertheless, I refer my specimens to that species for the following reasons:—1. Westwood's specimens were bred from galls of *Quercus palustris* received from U. S. (Papilio II., p. 97). 2. The size is nearly the same (*Gallivora*, alar expanse 8 lines). 3. "*Legs yellow, with a dark ring around the tibiæ near the tips,*" characterizes this feature exactly, especially true of the hind tibiæ; the first and second pairs are yellow, with more or less blackish on the outside of the tibial extremities.

The sexes of what I take to be *Ægeria gallivora* agree almost exactly in size and closely in ornamentation; the lower part of the front and a ring about the eyes milk white, above the white of the front shades into yellow, which extends about the first antennal joint, and is overhung by rather long blue-black scales, concolorous with the ground colour of thorax and abdomen; the palpi are yellow, blackish above; and the abdominal bands are two in both sexes, narrow in the male, the first narrow and the second broad in the female.

Although my material is scanty, I have reached the following conclusions regarding these gall-feeding and evidently inquiline species from

oak and hickory : *Hospes* is a good species, but what Walsh has said about the supposed female pertains to a species as yet unnamed ; and *Gallivora* is now rescued from forgetfulness.

*Egeria pictipes*, G. & R.—This moth is quite abundant throughout this district, and does serious injury to wild and cultivated cherry, as well as the plum. I have seen at least a score of pupal skins protruding from one tree at the same time.

*Egeria acerni*, Clemens.—Great numbers of our maple shade trees are injured, often ruined, by this species. It is, however, rarely seen in the forest.

*Egeria tipuliformis*, L.—The imported currant-stem borer is said to occur in Central Ohio. I have not yet taken it.

*Egeria lustrans*, Grote.—I have two examples. The type was captured by G. R. Pilate near Dayton, O., and is said to be "common in one place." The food-plant is unknown.

*Egeria corni*, Hy. Edw.—A moth taken at Sugar Grove, O., July 3, 1891, visiting the blossoms of basswood, I refer, with some hesitation, to this species. It resembles *Acerni*, but is smaller, and in every way more delicate. The agreement with Mr. Edwards's description of *Corni* (*Papilio* 1, 190,) is close, except the blackish third article of the palpi is not mentioned, and the underside of the caudal tuft is reddish orange or tawny, and not "bright orange." The expanse is 18 mm. instead of 15 mm.

*Carmenta pyralidiformis*, Walker.—Rare at Dayton. See List of G. R. Pilate, *Papilio* II., 65.

*Albuna modesta*, n. sp. I propose this name for a species taken on the University campus at Columbus in August last, resting on foliage. I have compared it with all of Mr. Edwards's descriptions of species in *Egeria*, as well as *Albuna*, and examined as many of his types as I have been able to consult ; also the species in the National Museum at Washington. I cannot recognize it among the descriptions or specimens.

The female has the head, thorax, abdomen and wings black above ; the palpi are rather long, sordid white below and inwardly, blackish above and outwardly ; the eyes are bordered by pale yellow scales ; the antennæ are black, with a white patch on the upper posterior surface one-fourth the length from the tip ; apical tufts black ; thorax and abdomen without streaks or bands above, beneath both are paler, with a few yellow scales on the sides of the metathorax. The anterior vitreous space of

the fore-wings is small and triangular, the posterior one likewise small and oval; interveinular spaces of the apical patch golden; hind-wings with very narrow black border, fringes throughout blackish; beneath hind-wings as above, fore-wings yellow to the discal spot, with interveinular spaces beyond of the same hue. Fore-coxæ black, with pale scales, especially on lateral edges; femora black, with more or less pale; tibiæ black, with the spines and a few scales at tip sordid white; tarsi blackish, ringed with dull white; abdominal tufts slight, concolorous, with a few yellow points at base laterally.

Expanse, 18 mm.; length, 9 mm.

I have referred the moth to *Albuna* rather than *Egeria* for the following reasons: 1, "the head is narrower than the thorax, which is not produced far beyond the base of the wings;" 2, "the antennæ are comparatively short," not reaching to the discal spot; 3, the legs are relatively short, on the other hand the tibiæ are not more than usually clothed with scales; 4, "the markings of the wings are heavy, the space between the submedian nervure and the inner margin is clothed with scales," except a minute clear space proximate of the clear triangle, and within the submedian; 5, the abdomen is fusiform without the apical brush.

The finding of the male may make the generic reference more certain.

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#### BOOK NOTICE.

List of Lepidoptera of Boreal America, by John B. Smith, Sc. D., etc., Philadelphia, American Entomological Society, 1891.

Prof. Smith divides the Lepidoptera into seven suborders:—(1) The Rhopalocera, containing four families; (2) the Heterocera, containing twenty-three families, and comprising the Sphingidæ, *Ægeriadæ*, Thyridæ, Zygaenidæ and Bombyces of Grote's list; (3) the Noctuina, containing three families; (4) the Geometrina, containing the single family Geometridæ, divided into nine subfamilies; (5) the Pyralidina, containing seven families; (6) the Tortricina, containing three families; (7) the Tineina, containing twenty families. Prof. Smith has been assisted by Dr. Skinner in the Rhopalocera, by Dr. Hulst in the Geometrina and Pyralidina, by Prof. Fernald in the Pyralidina and Tortricina, while the entire list of the Tineina is by Dr. Riley. The list contains 6020 numbered species, which includes the unidentified species described by Walker (243 in number) and other authors (in all, 79 names).

There are a few inaccuracies and omissions among the Bombyces which I should like to notice :—

Family Nycteolidæ, page 23, add *Sarrothripa reveyana*, S. V. (See Hy. Edw., Bull. 35, U. S. Nat. Mus., p. 55).

Family Lithosiidæ, No. 966, *Nola minuscula*, Zeller, should have precedence as it was described in 1872 (Verh., d. k. k. Zool. Bot., Gesell. XXII., 455), while *fuscula*, Grt., was not described till 1881 (Papilio, I., 76).

Family Arctiidæ, p. 27, No. 1113a, *Arctia sciurus*, Bdv., is given as a variety of *Euchaetes collaris*. Mr. Hy. Edwards once stated to me that it was the same as his *E. yosemite*. This would be a more probable synonymy, *sciurus* having precedence.

Family Liparidæ, p. 28, No. 1166, Walker's *clandestina* was referred to *Gluphisia* by Mr. Grote (CAN. ENT., IX, 21), but I do not know it, and it may really be *Dasychira*.

Family Notodontidæ, p. 30, add *Gluphisia avimacula*, Hudson. No. 1277 is the same as No. 1285, *Pheosia dimidiata*, H.-S., and I am of the opinion that *P. rimosa* and *P. californica* are synonyms of this. (See Psyche, VI., 194.) No. 1289, *Edema albicosta* is given as a synonym of *E. albifrons*. The forms can be distinguished, and I am not aware that they have been proven varieties. Nos. 1300 and 1302 are better referred to *Schizura* in my opinion. (See Psyche, VI., 177.) Page 31, No. 1339 is probably a synonym of No. 1345. No. 1342a is not a variety of *Cerura occidentalis*, but of *C. cinerea*. Perhaps I am responsible for this error, as my table in CAN. ENT., XXIII., 87, may be a little ambiguous, for I placed the var. *cinereoides* before *cinerea* instead of after it on account of the arrangement of the table. No. 1343, *C. scitisscripta* is given as a synonym of *C. cinerea*. This is surely a mistake. So far as I know it is a good species, and I have referred *candida*, Lint., as a variety of it, and not of *cinerea*, as it stands. *C. candida*, Lintn., has no affinity with *cinerea*, but the three forms, *scitisscripta*, *candida* and *multisscripta*, constitute a distinct group of the genus. Add *Cerura modesta*, Hudson.

Family Ceratocampidæ, p. 32, add *Dyocampa riversii*, Behr.

Family Bombycidæ, p. 33, *Hemileuca neumoegeni*, Hy. Edw., seems to have been overlooked. No. 1401, *Clisiocampa strigosa*, Str., is a synonym of *C. constricta*, Str. *Gastropacha alescensis*, Pack., seems to be wanting. (See Stretch, Zyg. and Bomb., N. A., p. 113.) No. 1419½ should be *Thauma ribis*, to keep the original orthography. (See Hy. Edw., Proc. Cal. Acad. Sci., V., 265.) And, finally, *Eutheca mora*, Grote, has been left out. (See Bull., U. S. Geol. and Geog. Sur. Terr., Haydn, VI., 257.)

The list will be the standard for some time to come, and should be in the possession of every entomologist.

HARRISON G. DYAR.

Mailed February 6th.

## BUTTERFLIES OF NORTH AMERICA.

Part XII., Vol., 3, issued 2nd January, 1892. Contents: *Papilio Americus*, and stages of *P. Zolicaon*; *Chionobas uhleri*, and stages; *C. Varuna*. Price, \$2.25; 3 plates. Vol. I., bound, \$35; Vol. II., \$40.

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## EXCHANGE.

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# The Canadian Entomologist.

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## MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1892.

*(Held at Rochester, N. Y., Aug. 17-19, 1892.)*

The Rochester meeting of the Club was probably the most interesting, both in attendance and interest shown, that the Club has ever held. The sessions were held in room four of Anderson Hall, University of Rochester, with an average attendance of fifteen. Members registered and received badges as follows:—Dr. J. A. Lintner, Albany, N. Y.; E. A. Schwarz, Dr. C. V. Riley, D. G. Fairchild, W. T. Swingle, M. B. Waite, Wm. H. Ashmead, L. O. Howard, Dr. C. W. Stiles and Erwin F. Smith, Washington, D. C.; Chas. W. Hargitt, Syracuse, N. Y.; Prof. D. S. Kellicott, Columbus, O.; Dr. John B. Smith, New Brunswick, N. J.; Prof. Béla Krécsey, Kecskemet, Hungary; Dr. E. B. Southwick, New York City; Prof. Herbert Osborn, Ames, Iowa; Rev. Chas. J. S. Bethune, Port Hope, Can.; Prof. F. M. Webster, Wooster, O.; Howard Evarts Weed, Agricultural College, Miss.; Henry G. Hubbard, Detroit, Mich.; P. H. Rolfs, Lake City, Fla.; Miss Edith J. Claypole, Miss Agnes M. Claypole, Akron, O.; Prof. G. H. Perkins, Burlington, Vt.; Prof. Wm. Saunders and James Fletcher, Ottawa, Ont.; O. F. Cook, Clyde, N. Y.; Rev. L. C. Wurtele, Acton, P. Q.; Prof. H. H. Wing, Ithaca, N. Y.

The daily programmes and announcement of the meetings were given in the programmes of the A. A. A. S.

### MINUTES.

The Entomological Club of the A. A. A. S. held its first session in room four, Anderson Hall, at 10 a. m., on Aug. 17. Owing to the absence of the President, Mr. J. B. Smith called the meeting to order. On motion of Mr. Howard, the chairman appointed Messrs. Lintner, Bethune and Osborn a committee to arrange the programme for the meeting. The Secretary, Mr. Marlatt, being unable to be present, Mr. Howard Evarts Weed was elected Secretary for the meeting. It being the hour for the

calling to order of the general session of the A. A. A. S., an adjournment was taken until 2. p. m.

The Club met at 2 p. m. and was called to order by President Schwarz ; twenty members present. The President called attention to the committees appointed at the Washington meeting of the Club who were to report at the present meeting. On motion of Mr. Smith, it was agreed to meet each morning at 9 a. m. and at such other times as would not interfere with the meetings of Section F. Mr. Riley occupied the chair during the reading of the address of the President by E. A. Schwarz, Washington, D. C.

[The address was published in full in the September number of the CANADIAN ENTOMOLOGIST, pp. 213-224.]

The address was discussed by Messrs. Riley, Smith and Howard as follows :—

Mr. Riley remarked upon the inferiority of modern as compared with older illustrations, one reason for this being the greater ease and rapidity of the illustrations of to-day. A good illustration is a labour of love and a scientific work. In detail illustrations the process method of illustration is satisfactory, whereas in copper plate and engraving the author must supervise the work, this being especially true in wood engraving. A wood engraver is more apt to damage a good drawing than the process methods. The latter have been a great aid to recent writers, who have thus had much advantage, and have been enabled to more fully illustrate their works. Mr. Riley thought that outline drawings were the most satisfactory, as they bring out the details more clearly.

Mr. Smith thought that the illustrations of the future would be largely made from photographs or photo-micrographs. It is now possible to prepare dissections and to have points of structure mounted in such a way as to bring out proper detail, and photographs can be made from these. Some details are thus brought out which otherwise would not be noticed.

Mr. Howard thought that there were two principal reasons for the inferior illustrations of recent writers. First, the artist does not understand how to draw for particular processes, and, second, although good illustrations were used, poor printing made them inferior work, as they required very careful printing and a good quality of paper. By the process methods illustrations are more easily and cheaply made, and thus more are now used.

The Club then adjourned.

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THURSDAY, August 18, 1892.

The Club met at 9.30 a. m., President Schwarz in the chair, seventeen members present. The minutes of the first day's proceedings were read and approved.

On motion of Mr. Smith, seconded by Mr. Lintner, the full proceedings of the Club were ordered to be published in the CANADIAN ENTOMOLOGIST, and an abstract of the proceedings in "Insect Life."

At the Washington meeting of the Club the Secretary was asked to obtain as full minutes of the former meetings of the Club as possible, to be preserved in permanent form. A bill was presented for some of the back numbers of "Entomologica Americana" containing the proceedings, and Mr. Smith stated that he would see that the bill was paid. Mr. Fletcher asked how the small expenses of the Club were met, whereupon several of the former secretaries of the Club stated that these bills were paid by the Secretary. Mr. Kellicott thought that a law ought to be passed providing for the payment of the few necessary expenses of the Club. He was in favor of an assessment, as next year the Club should have an especially good programme.

Mr. Smith objected to an assessment as this was not done by other clubs connected with the A. A. A. S., and most of the expenses were paid for by the Association.

Mr. Osborn objected to an assessment, in that it was not known just who were members of the Club, the membership varying from year to year according to the attendance at the Association.

On motion of Mr. Lintner hereafter the Secretary is empowered to meet the necessary expenses of the Club each year, and present a bill for the same at a future meeting.

On motion of Mr. Smith the President was empowered to appoint a committee to nominate the officers of the Club for the ensuing year. The President appointed Messrs. Fletcher, Osborn and Smith.

Mr. Kellicott then exhibited specimens of pine twigs damaged by *Retinia comstockiana*. Mr. Southwick stated that this insect, so called, was common in Central Park, but a comparison of some specimens which he had with some at Washington had shown them to be a different species.

The following paper was then read :—

## PREPARATORY STAGES OF CALOTHYSANIS AMATURARIA.

BY D. S. KELLCOTT.

The preparatory stages of this pretty Phalenid are not given in Packard's "Monograph of the Geometrid Moths", nor cited by Henry Edwards in his "Catalogue of the Preparatory Stages of N. A. Lepidoptera"; and, since they differ in some regards from the general characters of the caterpillars of the genus as given by Guenée, I have drawn up a brief account of larva and pupa.

The food plant at Columbus is *Polygonum dumetorum*, on which it was found in abundance during July and the first week in August.

Larva, 25 mm., long slender, cylindrical, with the last ring slightly swollen, and the first abdominal very much so, its diameter equaling twice that of the next ring. In ground colour there are two varieties: one deep brown or black, the other reddish or light brown. The skin under a lens exhibits paler lines and stripes made by whitish dots. Colour beneath similar to that above, except that the whitish stripes are plainer. The head is small, concolorous, with a white line on either side of the occiput extending on the prothorax; on the front there are four faint white longitudinal lines. On the 2nd, 3rd, 4th and 5th abdominal rings there is a pale lateral stripe, having three white curved lines on each, so arranged as to give the appearance of a slender stem twining about a rod. There are a few whitish dashes on sides of thorax; legs concolorous.

The larva clings to the smooth stems by its claspers, head downwards and body curved like an inverted clothes-hook. When disturbed it springs from its support to the ground, and quickly wriggles itself under cover. Its behaviour when walking is singularly hesitating and unsteady; after each step it lifts its body and explores right and left for danger before venturing another advance. When in this attitude its remarkably swollen first abdominal ring reminds one of a miniature cobra.

The pupa is light in colour, somewhat swollen below; the slender pointed abdomen tipped with black ends in a strong triangular piece edged with hooklets; the hind shield is triangular, with four tubercles between the base of the antennal covers and with the clypeal apex bilobed. Length, 12 mm.

The pupa is sustained among the herbage by a few silken threads, which are the merest shadow of a cocoon. Pupa July 26, imago Aug. 1.

Mr. Webster followed with a paper on

## INSECTS REARED FROM GALLS ON MUHLENBERGIA MEXICANA.

BY F. M. WEBSTER.

Eight years ago, in Indiana, I found a gall on this grass that had somewhat the appearance of a diminutive ear of corn with the husks, but more pointed and minus the silk. The husks (I can find no better term for them) were imbricated and pointed, being placed regularly, one over the other, leaving the junctures along the margins. In this gall I found a pupa or, as seems now more probable, a puparium, but reared no insect therefrom. The past spring, Prof. L. H. McFadden, of Westerville, Ohio, kindly sent me a number of these galls, from which, and the stems to which they were attached, I reared the following species:—

1st. Several specimens of an *Oscinid*. 2nd. A *Pteromalid*. 3rd. A *Eurytomid*. 4th. A great number of *Lasioptera*, probably the author of the gall. 5th. Numerous examples of a species of *Polygnotus*, probably a parasite on the *Lasioptera*. 6th. Specimens of a species of *Eupelmus* that might have come from eggs of Orthoptera, which had been placed in the gall by the parent, or from the puparia of a *Chlorops*, of which I reared no adults.

Thus, from a single species of gall, with a few inches of the stems to which they were attached, were reared six species, with proof of their having contained the seventh, while another, the eighth, had used it as a nidus.

Replying to a question by Mr. Lintner, Mr. Webster stated that it was possible that all the species named did not emerge from one gall, as there were about twelve galls in the breeding jar, but all from the same locality. It was not known how many came from a single gall, or how many from any particular gall. He also remarked upon the recent researches of Mr. Enock in regard to the Hessian Fly, who found that the breast bone of the larvæ was used in turning around within the puparium.

Mr. Smith remarked that in all species of *Cecidomyia* which he had reared the larvæ turned, but he did not see the necessity of using the breast bone.

Mr. Webster asked if there were not *Cecidomyidæ* without a breast bone, and thought that if this could be ascertained the question of its use in turning would be settled.



Muhlenbergia  
Mexicana  
Gall.



Mr. Kellicott stated that all Cecidomyidæ turn in their burrows throughout their lives, those with strong breast bone turning about quite freely.

Mr. Webster stated that he had observed thin, almost transparent, empty cases projecting from the apexes of the galls, and also found them in the bottom of the breeding jar. These he took to be the cases of the pupæ, and similar to those observed in connection with the wheat midge. Their presence, in this case, implied that enclosed in these the insect made its way out of the coarctate larval skin, and to the outside of the gall, before the imago emerged. He also stated that it would be interesting to verify the statements of Mr. Enock as to the use of the breast bone or anchor-process in the turning of the larva within the coarctate skin.

As few of the members of the Club had seen Mr. Enock's paper, he would make some transcripts from it which would explain his meaning:—  
\* \* \* “Anyone who will take the trouble to carefully examine, under the microscope, the *true* larva (by this I mean the larva in its first or *feeding* stage) will at once see that it does not possess any anchor-process at all; and it is not until the *final* larval stage, when the larva is securely sealed up within the puparium or coarctate larva, or second larval stage, that the anchor-process is developed and utilized in the most wonderful manner.” [Enock's Life-history of Hessian Fly, Trans. Ent. Soc. Lond., 1891, Pt. 2, (June) p. 336.]

“Though my endeavours to catch a larva in the act of turning round were not successful, I made some valuable observations from the contortions of the disturbed larvæ, the most important being that, by a powerful contraction of the muscles attached to the lower part of the anchor-process, the larva was enabled to draw the apparatus in at the base until it was at right angles to the normal position; the head, too, was drawn *quite* in, so that the forked end of the anchor-process projected to its fullest extent, and whilst in this naked condition it is thrust into the inside walls of the coarctate larva, the muscles are relaxed, and the ventral surface brought into contact with the inside ventral surface of the coarctate larva. Then other muscles appear to move a portion of the dorsal surface of the body downwards and round towards the bottom or head-end of the coarctate larva; the tips are then withdrawn, the base contracted again, and a hold taken by the tips being driven in a little

higher up; again the muscles bring a tiny portion of the body further round and down, and so this leverage goes on until the larva has completed its task, reversed its position, and rests with its head *up* and the anchor-process *outwards*; the spines on the skin of the larva, all of which point down toward the base, assist it materially in obtaining a firm hold on the inside of the coarctate larva, preventing it from slipping back." (Loc. Cit., p. 339.)

Mr. Lintner asked if the Cecidomyid on choke cherry has been described. Mr. Kellicott thought that the species had been described by Riley, but Mr. Osborn stated that he had had it under observation for four years, and so far as he knew no description of the species had been published.

Mr. Webster stated that he would send specimens of the galls on *Muhlenbergia Mexicana* to any members of the Club who so requested. He also stated that he had reared another species of *Lasioptera* from small, black, orbicular mines on the leaves of a species of *Solidago*, probably *S. lanceolata*. The species was very small and the larvæ were leaf miners.

Mr. Smith stated that he had seen the work of this species in New York, but he had mistaken it for fungus attack.

Mr. Stiles then made some remarks upon "A Cutaneous Disease of Cattle Caused by an Arachnoid." (This paper will be published in the next number of the C. E.)

In reply to a question, Mr. Stiles stated that this parasite was found as far west as Illinois and in many of the southwestern states. It shows itself on living animals by small lumps upon the skin, and after a time the hair dies at the place of attack. These, like most animal parasites, are only with great difficulty transported from one animal to another. There is a similarity in the species found upon the dog to that found upon the pig. It is hardly possible to mistake these parasites for larval forms, on account of the alomers upon the abdomen.

As the Section of Biology was in session, the Club adjourned until the close of that Section.

The Club met again at 12.15, twelve members present.

Mr. Riley read a paper upon *Galeruca xanthomelana* polygoneutic at Washington, which will be published hereafter.

Mr. Smith followed with a paper on *Galeruca xanthomelana* monogoneutic at New Brunswick, New Jersey.

## THE ELM LEAF BEETLE.

(GALERUCA XANTHOMELÆNA, Schrank.)

BY JOHN B. SMITH, SC. D.

My first practical acquaintance with this species began at New Brunswick, N. J., in the spring of 1889. In the Rutgers College campus there are a considerable number of elms, many of them grand old trees, which for several seasons in succession and up to 1888 had been defoliated by *Galeruca xanthomelæna*, larva and imago. A double row of young trees, many of them elms, extends from the College campus to the Theological Seminary, a distance of about 280 yards, and at the beginning of this row, most distant from the Seminary, the Experiment Station building is situated. There are also a considerable number of elms among the other shade trees in this part of the city. It was my intention to protect the trees in and near the College campus, and near the Experiment Station, from injury; and, to obtain accurate data for a full history of the species, I noted the dates of the principal occurrences in the life of the insect. According to these notes, the hibernating beetles began appearing in 1889 about the middle of April, very gradually increasing in number to the beginning of May, when they became more plentiful. Eggs were first noticed May 12, giving larvæ May 24. The details of the destructive measures adopted are immaterial here, and are published in my Report for 1889. June 28 nearly all the beetles of the hibernating brood had disappeared, and after July 3 no more were seen. At this time all eggs were hatched. July 5th pupation was quite general, and imagoes of the summer brood were developing in numbers July 15. There was a distinct period of a week or ten days during which no beetles could be found, and at that time no unhatched eggs were on the trees. The watch had been close, and I was positive that at the time the last of the hibernating insects had disappeared, the larvæ from the first lot of eggs laid were no farther advanced than full fed and ready for pupation. After the last days of June there were no egg masses to be found on the trees, and by the middle of August the beetles had all disappeared. I felt positive of my results, and published as a fact that the species was single brooded at New Brunswick. This was contrary to all that had been previously written; but in no published accounts were details of actual observations given. I repeated my observations in 1890 and 1891, and presented them at the Washington meeting of the Club. Dr. Riley felt quite certain that I was mistaken, though he could not question my observations, while

Dr. Lintner expressed surprise that the beetles should go into winter quarters in midsummer, and yet more that they should feed for so long a time previously. To settle the matter, if possible, I repeated my observations during the present season, while Dr. Riley carried on a series of observations at Washington, D. C. Dr. Riley, in *Science* No. 492 for July 8, 1892, records the facts that he then had imagos of a summer brood, and that these imagos had oviposited June 28. In a letter dated July 27, he informed me that the larvæ from these eggs had pupated. It is thus positively settled, that at Washington, D. C., there are two broods at least of this insect. My observations at New Brunswick gave an opposite result.

The season was rather later than that of 1889, and I saw no trace of beetles until May 17, and no beetles until May 19. The elms were at this time in full leaf, and began to show the characteristic little holes eaten by the insects. Eggs were first observed May 29, on a small tree, every part of which I could readily scan, and I selected this tree, which was a prime favourite with the insects, for special observation, while I also examined daily the trees in front of the Experiment Station building, the lower branches of which were within easy reach. Dissections made at this time showed that the ovaries of all the females were fully distended, each containing a considerable number of mature eggs, so many, indeed, that it was impossible to get out an ovary entire. The males, when examined, showed rigid, fully-developed testes, which were easily found and removed. The first batch of eggs gave larvæ June 6, and oviposition continued to June 20th, or perhaps a little later. The hibernating beetles gradually lessened in number, and had disappeared entirely June 30. On June 29, I found the first pupa, and on that day collected all the unhatched egg clusters I could find—a very few only. One of these clusters gave larvæ July 1, and all the others failed to hatch. During the first days of July, I gathered about 200 pupæ or larvæ ready for pupation, and beetles began appearing July 8 in the open air, as well as in my jars. There were then on the trees at this date larvæ of all sizes, pupæ and beetles of the summer brood, but *no* egg masses. The beetles in my breeding jars were fed until August 1, at which date all refused to feed further. I had noticed, a few days previously an indisposition to feed among some of the older beetles, and had noted, too, an unusual accumulation of excrement at the bottom of the jar. I found, later, that the last thing done by the beetles before retiring to winter quarters is to

empty the entire digestive tract. During the three weeks or more that the beetles were in my possession, I did not notice a single copulation, nor did I get an egg mass. Observations outdoors were to the same effect; not a copulation; not an egg-mass. On the new shoots put out by the trees early in August, there are now—the 13th—plenty of beetles, but neither eggs nor larvæ. When I observed this disposition to cease feeding, I dissected a number of the beetles, and in all of them I found the sexual structures undeveloped. The ovaries were minute, and could only be found by securing the large vagina to which they were attached. In the male it was almost impossible to get the testes entire, as they were mere empty tubules, which tore with the slightest strain. A number of newly-hatched beetles were secured and dissected, with the same results. Then a collection was made, selecting those with fully distended abdomens. In none was there more than a slight development of the ovaries, while in all, the digestive tract was gorged with food, and fat globules and masses were forming. I observed also that on the leaves some beetles had discharged long strings of excrement, and they were beginning to appear on the windows of my laboratory and in my house. I accepted this as an indication of a desire for retirement, and as I knew that the bell tower on the main college building was a favourite resort, I sent my assistant to investigate it, August 8. He brought back a vial filled with beetles, and reported that in a rubbish heap on the floor, covered by an old board, the beetles were to be found in large numbers. The bell tower was dark enough to make the use of a lantern necessary, and as there was no other explanation of their presence there in such large numbers, I feel justified in assuming that these beetles were in winter quarters. A number of these specimens were dissected, and in all of them the most prominent feature was the great mass of fatty tissue stored in the abdominal cavity. In all of them the entire digestive tract was free from food or excreta, and in all, the sexual organs were undeveloped.

I consider it positively proved that there is only one generation of this species annually at New Brunswick, N. J. The life of an individual beetle may extend from early in July of one year to well along in June of the following year, and the three weeks feeding time in summer is necessary to enable the insects to store a sufficient quantity of fatty tissue to help them through the nine months of lethargy. The feeding in early spring is again necessary to mature the sexual organs and develop the eggs in the ovaries of the female.

Mr. Riley accepted the facts brought forth by Mr. Smith, and remarked on the statement that the latter had found the ovaries more or less developed in some individuals. He had no doubt but that the species was normally single brooded at New Brunswick. This year the beetles had appeared at New Brunswick two weeks later than last year, which showed that the time of appearance varies greatly. One curious fact brought forth was that the beetles appeared at the same time as at Washington. He remarked also on the fact that during the month of June at New Brunswick there was no evidence of the development of larvæ, which was not the case at Washington. Life is quicker in the more northern regions, and under such conditions acceleration might be expected which was not the case with this species. There is a difference between the life at New Brunswick and that at Washington, and somewhere between these two places there must be a dividing line. Such cases of peculiar characteristics may be explained by heredity. Acquired characters which are beneficial have fixed themselves upon the species, and this, no doubt, accounts for the single or double broodedness of this or any other species.

Mr. Smith called attention to the fact that the observations recorded in the present paper were made in 1889 and the present year, while the observations of '90 and '91 were reported in the proceedings of the Club last year.

Mr. Southwick stated that in New York City spraying for this species was begun about the last of May and that he thought the species was there two, or perhaps three brooded, although Mr. Beutenmeuller of the American Museum has so far noticed but one brood.

In reply to a question by Mr. Lintner, Mr. Riley stated that at Washington the greater part of the second brood of beetles hibernated, although some doubtless laid eggs for a third generation. They disappear in August at Washington at the same time the first brood disappears at New Brunswick.

Mr. Schwarz called attention to the fact that there was a vast difference between the climate of Washington and New Brunswick, which difference he had especially noticed in the coleopterous fauna of these two places. An important investigation in this regard would be the behaviour of the species in the latitude of Baltimore and Philadelphia. The first brood did more damage at New Brunswick than did the same brood at Washington. In Washington it is the second brood that does the most damage, this brood being much more numerous.

Mr. Smith stated that as much difference as is noticed between the fauna of Washington and New Brunswick was also noticed in New Jersey itself between the red shale and the sandy plains regions, while many peculiar forms were found in the hilly north.

Mr. Riley thought that by an exchange of specimens between Washington and New Brunswick it could be easily proved that the single or double broodedness of the species was an acquired habit. He was strongly of the opinion that those received at Washington from New Brunswick would remain single brooded irrespective of climate, while those received at New Brunswick from Washington would be double brooded there.

Mr. Lintner asked if this matter of heredity was not the same in the difference noted between the thirteen and seventeen year Cicada.

Mr. Riley thought that this was the case, the seventeen year Cicada being a northern, and the thirteen year Cicada being a southern species.

In reply to a question, Mr. Smith stated that most of the larger Bombycids (*Saturniidae*) were double brooded in New Jersey.

The Club then adjourned until the afternoon, immediately after the adjournment of Section F.

The afternoon session was called to order by President Schwarz at 4.15, eleven members present.

Mr. Hubbard read the following paper:—

### THE INHABITANTS OF A FUNGUS.

BY HENRY G. HUBBARD.

In the forest-clad portions of the Pacific Coast Range, from the Columbia River northwards into British Columbia, there are frequently seen on the trunks of pine trees which have been injured and blackened by fire, small white fungi almost globular, or slightly flattened and kidney-shaped, varying much in size, but frequently attaining the dimensions of a pigeon's egg. This fungus, kindly determined for Mr. E. A. Schwarz and myself by Prof. Galloway, is *Cryptoporus (Polyporus) volvatus*, Peck., var. *obvolvatus*, Peck. It is very tough and leathery, and is remarkable for the extension of the pileus, which forms a thick coriaceous veil, covering the hymeneal surface below, and entirely enclosing it in a cavity which retains the spores as they fall. A small aperture in the veil, less than one-fourth of an inch in diameter, penetrates the cavity from beneath. This opening is never in the centre of the underside, but is placed near

the base of the fungus ; often so close to the bark of the tree as to escape notice. It gives ingress to a number of bark insects, and these visitors, it may readily be believed, play an important part in the dissemination of the spores and the propagation of this fungus, carrying the fructifying germs in their wanderings from the storehouse of the fungus into direct contact with the inner layers of the bark in which the mycelium lives and thrives. Other insects gaining an entrance by the same opening feed upon the substance of the fungus, and in process of time entirely disintegrate and destroy it, but probably in the process of destruction assist or hasten the ripening of the spores. If the full history of this fungus and its insect fauna could be written, many facts of great interest would undoubtedly be evolved, and it could perhaps be shown that we have in this cryptogam a peculiar structure adapted to the dissemination of the spores by insect agency, and analogous to the contrivances found in many flowering plants for the ensuring of cross-fertilization, or the economical distribution of pollen. Unfortunately, our acquaintance with this little cosmos is limited to a few desultory observations made in the field during a collecting trip to the northwest coast and the mountains of British Columbia, along the line of the Canadian Pacific Railway, during the months of May and June of the present year. Some of the insects observed are new to science or remain undetermined, and imagos were not bred from the larvæ found in the fungus. My present purpose in presenting these incomplete and imperfect notes is to call attention to an interesting association of insects that will well repay further study, and to stimulate further researches into the study of the inter-dependence of insects and fungi.

An entomologist accustomed to collect insects in our eastern woods will remark with surprise the comparative poverty of the bark fauna in the magnificent forests of the Pacific Coast. This is due partly to the thinness and tightness of the bark in many western conifers, and partly to the humidity of the climate, which favours the rapid growth of fungi, and these in fallen trunks quickly cement the bark to the wood. It is comparatively rare to find in these forests a log from which large pieces of bark can be readily removed, and which therefore swarms with bark insects as do logs of oak, elm and pine in the East. The bark insects of that region must find a welcome and often a timely refuge in the dark cavity of the Cryptoporous fungus, and as the plant is abundant on the tree trunks throughout extensive districts that have been overrun by fire, it may



readily be believed that this plant is an important factor in the distribution of certain species of Coleoptera. Thus I found lurking in this fungus *Cucujus clavipes*, a beetle that is usually rather fastidious in the selection of its abiding place, and which in regions where the basswood, with its loose, thin layers of inner bark, flourishes, will rarely be found elsewhere than in dead logs of this tree. The ubiquitous species of *Trogosita* are frequent visitors, as might be expected from their predatory habits, and other members of the family, as *Temnochila virescens*, *Peltis* and *Calitys*, were also seen, and in their company the tenebrionid, *Phellopsis porcata*. These, however, are genera which affect the neighborhood of coriaceous bark fungi everywhere, and their presence in this society is quite a matter of course. The rare tenebrionid, *Bius estriatus*, of which a single pair, presumably male and female, was captured in the cavity of one of these fungi, would seem to be a casual visitor only, as its attenuated, cylindrical form is adapted to threading the galleries of Scolytidæ and other bark-boring insects. Other insects, which for want of better knowledge may also be considered intruders, were an undescribed species of *Odontosphindus* in the imago, and a considerable number of unknown but probably predatory larvæ, including that of *Trogosita* and a clerid, which in the present state of our knowledge of coleopterous larvæ it would be useless to examine.

*Aradus debilis*, Uhler, an extremely thin and flattened hemipteron, swarms in and about the fungus, and evidently finds the cavity a favourable place of deposit for its eggs. A multitude of its young heaved and tumbled the dust within nearly every fungus. All ages were represented there, but the adult bugs seem to prefer the heat and warmth of the sun, and are found on the bark of conifers infested with the fungus. Their bodies, especially when immature, are particularly well adapted to transport the spores of a fungus. Everything in the nature of dust clings to them, and I have no doubt they constitute one of the most reliable propagators of the plant.

Perhaps the most interesting of the inhabitants is the Nitidulid beetle *Epuræa monogama*, discovered by Crotch, and described by him in 1874. He says of it: "Found in Vancouver and throughout the Sierra Nevada in the small white globular fungus which occurs on dead pines. This will be found to have a hole underneath, and if carefully detached a pair of the above insects will generally be found, unless a marauding *Trogosita*

has taken possession."\* My experience was that the "marauding *Trogosita*" frequently had taken possession, so that the monogamous *Epuræa* was by no means as abundant as I could have wished, for this beetle has, I think, not been seen since Crotch's time. It is a giant of its genus, being nearly equal to *Phenolia grossa* in size, and its colour is so dark and lustrous a brown as to be almost piceus. Notwithstanding its large size and conspicuous contrast in colour with the dead white of the fungus, it is a most difficult insect to discover, by reason of the facility with which its spine-clad body attracts and retains the white dust or spores of the fungus. This gives it perfect concealment in its home within the cavity of the fungus, and when abroad and denuded of its coating of dust, its dark colour harmonizing with the charred bark of the pine tree renders it almost invisible. On the 7th of June, at North Bend, in the Fraser River canon of B. C., I found the beetle occasionally present in fungi which had recently matured and were giving off spores, and always in pairs, as indicated by Crotch. Old devitalized fungi, or those already occupied by other insects, have no attraction for this beetle. Its larva was much more common, and undoubtedly the adult beetles become abundant later in the season. The full-grown larva is half an inch long, and is a very striking object. It is always coated heavily with dust and spores, and when at rest is almost invisible, but when in motion the segments part at the sutures, showing the pale pink colour of the body, and the animal looks like a moving necklace of pearls. It feeds only upon the spores, and the cavities of the fungi occupied by them never show any signs of having been gnawed or eaten on the sides.

Another beetle, *Platydema oregonense*, was very common in the cavities of the Cryptoporus at North Bend. It is one of the largest species of the genus, and several of them crowded into one small fungus must have found themselves rather cramped for room. It is not likely that the *Platydema* is dependent on the Cryptoporus for its living. Our eastern species of the genus are indiscriminate feeders upon many kinds of fungi, although they are usually associated with the tougher coriaceous sorts. The larva of *P. oregonense* was found commonly with the imagos, occupying the natural cavity or eating holes in the hemispherical upper portion of the pileus. Whenever the larva was present in the cavity of the fungus, the latter was always more or less filled with a loose tangle of brown filaments resembling hair. The nature and origin of these filaments

\*Trans. Amer. Ent. Soc., Vol. V., 1874, p. 76-77.

has not been satisfactorily made out. Peck, in his description of the fungus, refers to them as if he considered them a product of the plant. He says: "It is not unusual to find little heaps, or even masses of spores retained within the veil. These heaps of spores are generally permeated by minute filaments, which apparently aid in holding the spores together."† Observe that the author speaks of them as generally present, leaving it to be inferred that they are in some cases absent. This accords with my observations. Many of the fungi having matured and become dry retain the tangles of filaments, in which also the cast skins of the *Platydemia* larvæ may be found suspended. Other specimens can easily be found which have never been occupied by this insect, and contain no filaments. Moreover, this fungus is not the only one exhibiting a similar connection between a *Platydemia* and these hair-like filaments. I can recall instances in which artificial cavities made by boletophagous larvæ in the pileus of some of our eastern fungi were similarly filled with filaments, among which the larvæ of a *Platydemia* passed actively back and forth. I am, in fact, of the opinion that these filaments are closely connected in some unexplained way with this beetle. If not produced directly by the *Platydemia* larvæ itself, they may be a separate fungus engendered by its debris. In any case they certainly serve a purpose very useful to the active larva in providing it with a convenient scaffolding on which its lithe, elongated and exceedingly slippery body is securely supported, and by means of which it can climb about and reach any part of the interior of the cavity, the walls of which it is engaged in eating away.

It remains to mention a few other insects which attack the substance of the fungus, burrowing into the spongy pileus and piercing holes innumerable in its leathery walls, ultimately disintegrating and destroying it. These are a species of *Cis* or *Ennearthron*, and two lepidopterous larvæ which were not studied and remain entirely unknown. My field notes merely state that one of these is a larva nearly an inch long, living in the hymeneal cavity and filling it with web. The second species is a shorter and thicker larva, which eats its way into the solid base and thick upper portions of the pileus, entirely destroying the whole structure. Three or four of these larvæ are found in one large specimen of the fungus.

The work of the *Cisid* and its larva is too well known to require a detailed description. The beetle occupies in great numbers the cavities

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† Bulletin Torrey Botanical Club, Vol. VII., 1880, p. 102.

and burrows made by larger insects, and feeds indiscriminately upon every part of the plant, while its little white larvæ bury themselves deep in the tough and spongy interior, gradually reducing it to powder. Under the combined attacks of the adult *Cis* and its larva the fungus becomes a thin, dry shell, tattered and riddled with holes. Or its hold on the tree trunk being undermined, it is beaten to the ground by rains, and becoming water-soaked is abandoned to the snails, poduras and scolopenders.

LIST OF INSECTS IN CRYPTOPOROUS VOLVATUS, VAR. OBVOLUTUS, PECK.

*Cucujus clavipes*, var. *puniceus*, Mann. Predatory (?) visitor.

*Trogosita*, sp., not determined, and larva. Predatory visitor.

*Temnochila virescens*. Predatory visitor.

*Peltis Pippingskoeldi*, Mann., and *ferruginea*, Linn. Predatory visitors.

*Calitys scabra*, Thunb. Predatory visitor.

*Bius estriatus*, Lec. Probably a fungus eater.

*Phellopsis obcordata*, var. *porcata*, Lec. Fungus eater.

*Odontosphindus*, n. sp. Fungus eater.

*Epuræa monogama*, Cr., and larva. Feeding on spores.

*Platydemæ oregonense*, Lec., and larva. Feeding on pileus.

*Ennearthron*, n. sp., larva and pupa. Feeding on the fungus.

*Araclius debilis*, in all stages. Predatory (?), breeding in the fungus.

Two species of lepidopterous larvæ, undetermined. Feeding on the fungus.

Unknown coleopterous larvæ of several species. Probably predatory.

In reply to a question from Mr. Weed, Mr. Hubbard stated that no dipterous larvæ were noticed, and Mr. Schwarz stated that the fungus was doubtless too dry for the larvæ of this order.

Replying to a question by Mr. Ashmead, Mr. Hubbard stated that he thought a very similar fungus was to be found upon pine logs in the South.

Mr. Schwarz hoped that this paper would bring forth other investigations of a similar character showing the intimate relations of insects and fungi.

Mr. Riley then read a paper on "The American Bean Weevil," which will be published hereafter.

In reply to a question by Mr. Fletcher, Mr. Riley stated that this species could not be definitely stated to be of American origin.

Mr. Lintner stated that Say's description of *Bruchus obsoletus* was very general, and Dr. Horn only claimed that the description "fits the species fairly well." In deference to the opinion of some of our coleopterists who thought that the name *obsoletus* should be retained, Mr. Lintner had used this name in his seventh report. Mr. Lintner also stated that he considered the species a native of Europe or Asia, probably the latter.

Mr. Schwarz thought that Say was not always correct in regard to the food plants upon which he states insects are found.

Mr. Smith thought that descriptions which fit even fairly well must be accepted, for if this was not done about ninety five per cent. of the descriptions of Lepidoptera by Walker would have to be thrown out.

Mr. Fletcher stated that when young larvæ were in peas, the radicle would be the first point attacked. It had been his experience that only from two to five per cent. of attacked peas germinated.

Mr. Lintner stated that those which germinated and gave vigorous plants had but few pods, and these but few beans. One point of interest was that *obsoletus* is not found in Canada except when directly brought in.

Mr. Webster then introduced Dr. Edward Murphy, of New Harmony, Ind., who gave the Club an interesting account of the life of the pioneer of American Entomology, Mr. Thomas Say. Dr. Murphy was intimately acquainted with Mr. Say from 1827 to the time of his death in 1834. "In boyhood Mr. Say was a great collector of all sorts of natural history specimens. He was the most perfect gentleman that I ever met in my life, and I do not believe that he had an enemy in the world. He was tall, about six feet in height, square built, but not fleshy. In winter he wore a thick buckskin overcoat. He had a peculiar lisp in his speech which was pleasant to hear. As a boy I worked in a printing office where some of his works were published. Mr. Say was a very pleasant story teller, and very studious. The colour of his eyes was gray. He always lived in a very plain manner, and his old home is still standing at New Harmony, and in fair repair. His wife often accompanied him on his collecting trips. She was a very pleasant lady. Mr. Say was induced to come to New Harmony by Mr. Maclure, an amateur naturalist."

Mr. Hubbard then read the following paper :—

## THE LIFE HISTORY OF XENOS.

BY HENRY G. HUBBARD.

How often, in turning over the pages of his check-list, has the American collector of beetles allowed his eyes to rest a moment upon those lines of type which announce the existence in our fauna of the mysterious family Stylopidae, with its two genera, *Stylops* and *Xenos*, each represented by a single species; but, recognizing in these names only the records of captures almost legendary in their antiquity, he has turned the page with a feeling that they represent to him unattainable rarities. In fact, to most minds they bring to remembrance only the remarkable bat-like figure of the male *Stylops*, which for generations has done duty in all the encyclopedias and text books. But why should these insects be considered unattainable rarities? Are they as rare in nature as their vacant places in our collections would seem to indicate? I do not hesitate to assert that they are not. If we question any hymenopterist of experience, he will tell us that *Stylopized* bees and wasps are not uncommon. By this is meant that specimens of hymenoptera are found having certain chitinous particles protruding from their hinder bodies, appearing at the sutures between the abdominal segments. These betray the presence in the wasp or bee of either the female or the pupa of the male parasite. In the first case the so-called head of the female presents only a bluntly-pointed scale, so flat and thin that it hardly raises appreciably the horny covering of its host, and, at most, barely peeps out beyond the edge of the overlapping plate. The pupa of the male, on the other hand, is a cylindrical capsule of considerable thickness, and often distorts the smoothly tapering abdomen of the hymenopteron. Its darkly chitinous, convex end projects boldly forth, and certain little tubercles upon its surface form a grotesque face, with staring goggle eyes, which are in fact faceted, and perhaps give a limited amount of vision to the nymph imprisoned within. When the winged male of the parasite issues from this capsule, the mask-like face is pushed off like a cap and falls to the ground. As a rule, when *stylopized* hymenoptera are captured in the field, the male parasites have long since issued, and hence their rarity in our collections. But the females never leave the bodies of their hosts, and might be readily obtained at certain seasons.

In general it has long been known that *Stylops* inhabits bees, and *Xenos* wasps of the genus *Polistes*. As far as I know the male of *Stylops* is not to be found in any American collection, but specimens of *Xenos*

have been sparingly collected in this country, and it may therefore be of interest to relate my own experience in procuring them.

In 1891, while studying the insects that attack the orange in Florida, I had occasion to examine the nests of *Polistes Americanus* (Fab.), which are very commonly found in orange trees. This species is one of the largest in the genus, and its sting is quite equal in severity to that of our white-faced hornet. It is, moreover, very active and belligerent in defending its home, so that the investigation of its social economy is attended with considerable danger and difficulty. However, it is not inclined to be irritable unless directly attacked, and with care I was able to approach sufficiently near one of their large, naked paper nests to observe all their movements without seriously alarming the colony. One of my first discoveries was that many of the adult wasps were stylopized. Sometimes eight or ten of the parasites distended the body of a single wasp, and this without destroying its life, although it could be seen that such overburdened individuals were lacking in vitality, and appeared to be on the sick list, as they rarely left the shelter of the nest. The older wasps were actively engaged in attending to the wants of the colony, and were constantly departing and returning with small caterpillars and other insects, which, after masticating into pulp, they fed to the young, both larvæ and imagos. The callow young, however, passed several days of their adult existence in a state of inactivity, and did not leave the vicinity of the nest, apparently acquiring their full powers, both mental and physical, rather slowly. I soon found that only these late comers in the colony carried about with them the undisclosed males of the parasite. The pupa cases found in the bodies of the older wasps were invariably collapsed and empty. This decided me to take possession of the nest and confine it in a vivarium, where I could study the young wasps from the time of leaving their cells in the comb. After some difficulty, and not without carrying away with me a few tokens of the vengeance of its defenders, I bore away the comb in triumph, and suspended it in a small box with sides of glass, through which I could observe everything that transpired. Through the wooden end of the box I inserted a tube filled with sweetened water and closed with a bit of sponge. I included in the box, as caretakers for the young, one or two fully adult wasps. These soon resigned themselves to their new surroundings, and not only themselves drank liberally at the feeding trough, but also attended to the wants of the larvæ and the newly disclosed wasps, which immediately began to make their appearance from

many capped cells in the comb. In about a week I had a colony in full career, and it soon became so populous that I was obliged to remove many of the adults. This was accomplished with the aid of a long pair of forceps manipulated through a trap door.

As my primary object was to secure the coveted males of *Xenos*, I was not a little chagrined and surprised to find that these continually escaped me, and in some mysterious manner disappeared, so that I was not even gratified with a glimpse of one of them. That they were produced within the vivarium I could not doubt. The empty capsules protruding from the bodies of many of the wasps were evidences of this, and the little mask-like lids which lay plentifully scattered about on the bottom of the box confirmed the fact. Moreover, many wasps a day or two old wandered about with the little faces of the unopened male capsules grinning at me from between the joints of their bodies, as if mocking at my discomfiture.

At last, early one morning, chancing to take a look at my captives, I observed the whole society in a state of great excitement. Wasps stood about with wings half raised or vibrating angrily, with antennæ alert and watchful, while now and again one of them would make a sudden dart with its jaws at an invisible object in the air. The whole company seemed bewitched. Steadying my eyes and watching closely I began to see several misty little objects darting with fury about the box, ever and anon dashing among the wasps, which, like cattle attacked by gad-flies, huddled together in groups and awaited the onslaught. In the dim half light of the early morning I could not follow their rapid movements with my eyes, but their whereabouts could be told, from time to time, by the commotion among the wasps whenever one of them approached very near. Finally, on the floor of the cage, a male *Xenos* suddenly made its appearance, spinning round and round on its back like a fly with its wings burned in a candle flame. A *Polistes* standing near the spot promptly pounced upon it, and, before it could be rescued, had reduced it to pulp in its jaws. In the same manner I lost, one by one, all of the four or five specimens that were abroad at that time. Such was the watchfulness of the wasps, and so great their hatred and fury against these little persecutors, that in spite of all precautions nearly all the male parasites were captured and destroyed before I could lay my hands on them. I succeeded in saving not more than half a dozen specimens out of more than a hundred that were set free in the box. As no-additions were made



to the brood, and many of the youngest larvæ died in their cells, in a few weeks my vespiary came to an end, having been under observation from the 23rd of June to about the middle of July. From the study made of its habits during that time I am able to give the following review of the life history of *Xenos*. Many of the facts are not new, but have been so rarely observed that it will not be amiss to repeat them.

The young issue from a slit in the so-called head, which may after all be the anal extremity of the mother, after it has protruded from the body of the wasp. A single female gives birth to hundreds if not thousands of them. They are at birth six-legged triungulins, fairly active, but so small that they are barely visible to the naked eye. Under a hand-lens they bear a marked resemblance to the young of scale insects, having a similar oval form and a pair of long anal stylets. They wander over the body of the wasp, apparently giving it no inconvenience, and are also seen crawling about the nest. In some way they pass into the bodies of their hosts while the latter are very young larvæ. Within the bodies of the wasp-grubs they occupy varying positions, but always in the fatty matter near the skin. Their form now becomes very elongate and worm-like, without any organs visible under low magnifying powers. Their delicate and transparent bodies seem to be simple sacks filled with fatty matter, in which float globules of oil. When full grown the larva of *Xenos* is about three-eighths of an inch long. The female parasite finally acquires a chitinous plate at one end of the body and becomes adult. The male shortens to about one-half its former length, thickens and becomes cylindrical, the anterior end is chitinous and shows traces of faceted eyes and rudiments of other organs, the convex end of this chitinous portion is separated by a sutural line, and forms the mask-like cap of the puparium. While the wasp is in pupa, or at least before it has left its cell in the comb, the parasites of both sexes push their chitinous extremity out of its body, appearing at the sutures of the last four or five segments. Within a few days after the wasp has left its pupa cell, the male *Xenos* pushes off the lid or cap of its puparium and makes its appearance, taking flight at once. It never alights or rests in its flight from the moment of birth until it falls exhausted and dying, worn out by the incredible activity of its short existence. Its life as an active imago cannot be longer than fifteen or twenty minutes, if as long, and during this time it exhibits fiery energy, and flies so rapidly that the eye can hardly follow it. Its legs are shrunk and entirely useless organs, and I think the muscles

are atrophied, as I never saw the legs move even in the death struggles. How the fertilization of the female is accomplished I am unable to state, but that it must be the act of a moment is evident from the watchfulness of the wasps, who would certainly not permit these buzzing little whirligigs to remain more than an instant in contact with their bodies.

All the males bred by me issued very early in the morning, and most of them before daylight. I do not think its delicate wings and imperfectly chitinized body could support, even for a single minute, the light and heat of the sun. A specimen which I liberated in the day time from the body of a wasp, took flight and escaped at once when the cap of its puparium was pulled off. I found it a few minutes later quite dead on the table a short distance away.

The species of *Xenos* bred in Florida from *Polistes americanus* is probably undescribed; it is smaller and paler than *Xenos Peckii*. The latter is said by Harris to have been "discovered by Prof. Peck in the common brown wasp (*Polistes fuscata*) of this country." Judging from the numbers of stylopized specimens of this wasp which I have seen it must be far from rare in some colonies. The few specimens of *X. Peckii* which I have been able to obtain were all extracted from their puparia in the bodies of wasps taken near their nest between the walls of an old building. One specimen which I collected in the Cumberland Mountains of Virginia issued from the body of a *Polistes* found hiding under bark. I imprisoned the wasp in a glass tumbler, and several days later found the parasite dead and adhering by one wing to the side of the glass.

A good device for procuring specimens of *Xenos* from colonies of *Polistes* known to be infested with the parasite would be to enclose the nest in a box having a false bottom of wire netting through which the males of *Xenos* would fall as they die, and which would thus prevent the wasps from destroying them.

Mr. Hubbard stated that he had never seen stylopized wasps of any genus but *Polistes*.

Mr. Ashmead stated that they were quite common among the Andrenidæ.

Mr. Riley thought that these parasites could be divided into two classes, those that were carried into the cells by the female wasp, and those that were deposited by the parent of the parasite.

Mr. Kellicott stated that the case bearer, *Thyridopteryx ephemera-*

*formis*, which he had found at Columbus, Ohio, were somewhat different from those exhibited by Mr. Southwick, *i. e.*, more nearly cylindrical.

Mr. Riley stated that he knew of no other species of Thyridopteryx similar to *ephemeraformis*, although this species differed much as to the character of their cases, especially those upon pine, when compared with other trees.

Mr. Kellicott stated that the larvæ of *Pterophora melsheimeri* which he had noticed at Columbus did not have the prominent paddle-shaped appendages at the side of the head as always described; that the case was a more perfect structure than that figured by Harris; and that the moth's wings were more deeply sinuate, with the edges trimmed with white.

The Club then adjourned.

FRIDAY, August 19, 1892.

The Club met at 9.45, fourteen members present. The minutes of the morning meeting of the previous day were read, and after amendment, approved.

Mr. Lintner occupied the chair while Mr. Schwarz read a paper upon the Males of *Xyleborus*.

Mr. Schwarz stated that there was no relative proportion of numbers of the females to the number of males. In reply to a question by Mr. Lintner, Mr. Schwarz stated that the white lining found in the borings of *dispar* and other species was supposed to be a fungus, but it was not known definitely.

Mr. Smith thought it could be easily determined if it was a fungus by microscopical examination.

Mr. Osborn followed with Notes on the Species of *Acanthia*.

#### NOTE ON THE SPECIES OF ACANTHIA.

BY HERBERT OSBORN.

I desire to call attention to the species of this genus, in order to get further information, if possible, as to the occurrence of the species in this country. The species of the genus that were described by Jenyns (*Annals of Natural History*, 1839, III., p. 241-244) have often been considered simply as the common house-bug occurring upon the different animals which they were described as infesting—the bat, the pigeon, and the swallow. As these descriptions are quite inaccessible to most students, it will be in place to repeat them here, so that they may be compared and

used in the examination of any specimens obtained from different species of animals :—

"*Cimex hirundinis*.—This species is rather less than *C. columbarius*, and in respect to form different from both that and the *C. lectularius*.

"The antennæ are comparatively short, and the third joint is scarcely, if at all, longer than the fourth. The eyes are not so prominent, the thorax is much less hollowed out in front, the anterior angles but little produced, and the sides scarcely at all reflexed. The scutellum is wider at the base or more transverse, and does not project so far backwards. The elytra are less coarsely punctured; the abdomen is not so broad and more rounded at the apex; the sides regularly curved. The whole insect is more pubescent. The colour is ferruginous inclining to testaceous, darker than in the common bed-bug, and the head and thorax are much clouded with fuscous. In one specimen the legs are spotted at or near the joints with this last colour. There are also some fuscous spots on the abdomen.

"The young or pupæ have the abdomen much narrower than the perfect insect, inclining to oblong.

"*Cimex pipistrella*.—The antennæ of this species are of an intermediate length between those of the *C. lectularius* and those of the *C. columbarius*, and the third joint is obviously longer than the fourth. The eyes are prominent. The thorax has a moderately deep excavation in front, and the sides are partially reflexed. The abdomen is narrower than in either of the above named species, and much more attenuated posteriorly, the greatest breadth being rather before the middle. The thighs are more incrassated. The whole insect is more pubescent approaching to hispid, and rather coarsely punctured. The colour is dark ferruginous-ochre, glistening with a faint metallic or sub-aeneous hue, not perceptible in any of the other species. The legs and antennæ are a shade paler than the abdomen, and, as well as this last, without spots.

"*Cimex columbarius*.—On comparing this species with the common house-bug, it will be found to be smaller and of a more orbicular form. The antennæ are shorter, and the joints are not quite so slender, and the difference in length between the third and fourth joints not so considerable. The thorax is rather less hollowed out in front, the anterior angles less produced, and the sides less reflexed. The abdomen more nearly approaches to round, the lateral margins being very much curved, and the greatest breadth exactly in the middle; whereas, in the house-bug the lateral margins are at first but little curved, and the greatest breadth rather

behind the middle. The colours, as well as the punctures and the degree of pubescence, are similar in the two species."

Of these species the first named, the *hirundinis*, has been collected in large numbers by Prof. Gillette and myself at Ames, from the nests of barn-swallows, being first reported to us by workmen who were placing eavestroughs on the barn.

A short note on the species was published by Prof. Gillette in "Entomological News," under the name of *pipistrellæ*, with Mr. W. H. Ashmead cited as authority for the determination. The use of this name came from some verbal misunderstanding, we believe, and there is no question as to the specimens belonging to the form described by Jenyns as *hirundinis*. The specimens when compared with *lectularius* show very distinct differences, and these differences appear to be constant, as well as the habit of the insect, and it seems to me that the separation of the species is well founded, especially if the other forms are as distinct as this, and we would gather as much from the descriptions which have been quoted.

I should very much like to secure specimens or information as to the occurrence of the other species in this country, and the principal object of this note is to engage the attention of some one who may have the opportunity to examine the nests of bats and pigeons, where possibly they may be found.

The species found in the swallows' nests appears to remain entirely in the nests or upon the barn adjacent to them, some being observed on the sides of the barn nearly down to the ground. They were very abundant after the swallows had left, and specimens kept in a bottle corked with a rubber stopper were alive and active the following summer, so it would seem an easy matter for them to remain in the nests till the return of the swallows in the spring. The nests contained immense numbers of empty egg shells, showing that the eggs were deposited directly in the nests, and where the young bugs when hatching would at once get access to the birds.

In reply to a question by Mr. Stiles, Mr. Osborn stated that his observations were based upon the examination of several hundred specimens. He had examined what few bats he had had in the laboratory, but had had no opportunity to examine them in caves.

Mr. Lintner stated that housekeepers were generally of opinion that swallows brought *Acanthia* into houses.

Mr. Hubbard stated a case coming under his observation where a bat

had been put into an entomological case, and upon examination of the case afterwards a living *Acanthia* was found.

Mr. James Fletcher gave an entertaining account of a trip to Nepigon, north of Lake Superior, in quest of eggs of *Chionobas macounii*. No eggs of that species were obtained; but many interesting observations were made. Eggs of *Nemeophila selwynii* were secured, and the larvæ bred from them were described. *Grapta faunus* was bred from larvæ found on *Alnus viridis*, *Salix discolor* and *Betula papyrifera*, and an undescribed parasite was also reared. *Grapta progne* was also reared from larvæ on *Betula papyrifera*. The pupæ of several species of *Grapta* were described and outlines shown on the blackboard by which they could be distinguished. *Colias interior* was mentioned, and the food plant was stated to be willow (from the observations of Mr. T. E. Bean in the Rocky Mountains). Mr. Fletcher was of the opinion that it was also *Vaccinium*. Specimens of two western species of *Argynnis*, *A. ciprois* and *A. electa* were taken at Nepigon, and the occurrence there commented on. *Lycana lucia* was taken and an addition made to its food plants in the flowers and seeds of *Acer spicatum*. *Carterocephalus mandan* is not uncommon at Nepigon in roadways running through low woodlands. Eggs had been secured on grasses and several larvæ were being bred. *Nisoniades icelus*, common at Nepigon, was being bred from eggs laid on the upper side of the leaves of *Salix cordata*. The larvæ were found to exhibit different temperaments, one particular specimen being described as "very bad tempered". Some beetles had been collected, and the oviposition of *Myodites zeschii* in the unopened flowers of *Solidago canadensis* was described. An interesting *Mordella* had been taken on a white fungus growing on an old wharf, but the species did not seem to answer to any of those in the available literature. Species of *Donacia*, *Leptura* and some *Carabidæ* had been collected. *Trirhabda convergens* had been found abundantly on asters and solidagos. Of Hymenoptera many interesting species had been secured, *Abia kennicottii* amongst them, and several specimens of *Trichiosoma triangulum*.

Mr. Smith remarked upon the inactivity of *Myodites*. He had taken them upon solidago in New York State and had experienced no difficulty in collecting them upon the flowers at any hour of the day.

Mr. Schwarz stated that they were very active on buds, and it was somewhat difficult to collect them.

Mr. Cook then gave a few Notes on the Arthropoda of Liberia.

[TO BE CONTINUED.]

## NEW NORTH AMERICAN HOMOPTERA.--No. V.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

1. *THAMNOTETTIX SMITHI*, n. sp.

Male: Form of *Th. quadrinotata*, Fab., but with the vertex shorter and more depressed. Greenish-yellow; head yellow with a transverse black band on the anterior edge; body black the segments edged with yellow. Length  $4\frac{1}{2}$  mm.

Head rounded before, very little longer at the middle than next the eye. Vertex a little depressed, anterior edge subacute; apex of the front two-thirds the width of the base, sides nearly parallel below the antennæ. Clypeus strongly widened apically where the width is but slightly less than the length, edge of the cheek rectilinear either side of the prominent lateral angle. Pronotum rather long, hind edge but moderately concave, the angles obvious. Antennal setæ long and stout, dusky. Valve obtuse-triangular, its length and breadth subequal; plates irregularly ovate, shorter than the valve, sutural edges arcuated, touching only at the middle, outwardly heavily fringed with long white hairs; pygofer slender, longer than the plates, viewed from beneath lanceolate with slightly diverging tips.

Colour pale greenish-yellow, lemon-yellow on the vertex and connexivum, anterior edge of the head marked with a conspicuous broad black transverse band just below the line of the ocelli; sutures of the clypeus and front slenderly black. Meso-, and meta-thorax and abdomen deep black, narrow edge of all the segments, the scutellum and the genitalia greenish-yellow, the disc of the valve and a spot on the base of the pygofer blackish. Elytra sub-hyaline, smoky at apex, with slender greenish nervures. Wings smoky, iridescent.

New Brunswick, N. J. Described from a single male example kindly given me by its captor, Prof J. B. Smith, to whom I take pleasure in dedicating it. This is a neat little species pertaining to the group represented by the European *quadrinotata*.

2. *THAMNOTETTIX LONGISETA*, n. sp.

Female: Closely allied to the preceding species. Dull yellowish or dusky green. Vertex as in *Smithi*, anterior edge more obtuse, impressed line blackish at base, disc anteriorly with a small dot behind each ocellus, edge with a transverse row of four large subquadrate, approximate spots placed just below the line of the ocelli; edges of the front more deeply

excavated opposite the antennæ, disc with three or four blackish arcs interrupted on the middle; clypeus less expanded apically. Cheeks thin, discoloured exteriorly, angles more rounded than in *Smithi*, sutures of the face more heavily lined with black. Second joint of the antennæ annulated with black; seta long, as in the preceding species. Pronotum shorter, with the sides more oblique, the posterior angles more rounded, and the hind edge more deeply excavated than in *Smithi*; disc greenish, marked anteriorly by a slender, oblique black line behind the eyes, touching the lateral angles. Elytra hyaline, slightly infuscated toward the apex; nervures very distinct, pale blue-green, brownish at apex. Beneath black; narrow edges of the connexivum and abdominal segments, outer angles of the last ventral segment, and sides of the pygofer, yellow. Legs pale yellow. Last ventral segment rather long, hind edge entire, truncated, the outer angles slightly produced. Length 4 mm.

Northwestern Colorado. Described from a single female example received from Prof. C. P. Gillette. This is closely related to *Th. Smithi*, of which it may prove to be the female, but the differential characters mentioned above seem to entitle it to specific distinction.

### 3. *THAMNOTETTIX GILLETII*, n. sp.

Form and general appearance of *Th. latus*, Uhl.

Female: Colour yellow, tinged with greenish on the pronotum. Vertex moderately produced, apex rounded, basally with an impression either side of the middle. Front narrower than in *latus*; clypeus widened apically, the sides arquated. Apex of the head with two large round spots, and on the vertex on either side is a smaller one placed against the middle of the inner margin of the eye. Pronotum highly polished with an impressed line parallel to the anterior edge, hind edge nearly straight. Scutellum polished, the impressed line black. Sutures of the front and the antennal pits black, the setæ dusky. Sternal and pleural pieces black, the latter edged with yellow. Abdomen yellow, disc of the tergum and the oviduct black. Legs yellow, tips of the tarsal joints dusky. Elytra hyaline, smoky at tip, nervures yellow, becoming heavier toward the inner margin. Last ventral segment rather long, outer angles rounded, apex nearly straight with a narrow linear notch. Length 5 mm.

Colorado. Described from a single female example received from Prof. C. P. Gillette, to whom I take pleasure in dedicating this pretty little species.



In Mr. Gillette's material was an example of a species I take to be Mr. Uhler's *Jassus* (*Thamnotettix*) *latus*, but it differs from his description in wanting the minute fuscous dots at the tip of the vertex, and the black basal spots on the scutellum. In this specimen, a female, the last ventral segment is cylindrical, a little longer than the preceding and feebly arquated behind without a median notch. Clypeus slightly narrowed apically, its sides rectilinear.

4. *THAMNOTETTIX MONTANUS*, n. sp.

Allied to *Th. clitellaria*, Say. Smaller; dark brown or blackish, face pale. A transverse band on the pronotum and a small spot on the elytral suture yellowish-green, polished. Length  $4\frac{1}{2}$  mm.

Female: Head obtusely rounded before, soiled white or yellowish, base of the vertex with a transverse fulvous-brown band between the eyes covering the apical one-half of the pronotum, ocelli fulvous; front with a few short brown arcs next the edges, the sutures blackish, clypeus slightly widened apically; cheeks infuscated below the eyes. Pronotum polished, pale greenish-yellow on the posterior one-half, hind edge feebly concave. Scutellum dark brown, blackish on the base and apex, the impressed line black. Elytra blackish, costal half of the corium as far as the apical areoles hyaline, apex of the clavus and its nervures black, sutural edge with an oblong greenish spot. Beneath black. Legs whitish. Abdomen black; connexivum, a slender median line on fourth and fifth, apex of the ultimate, and the narrow edges of all the ventral segments, and the oviduct, pale yellowish. Last ventral segment deeply cleft either side of the ligulate median projection, the shorter lateral lobes rounded, retreating at the outer angles. Male: More deeply coloured, scutel and elytra black; abdomen black, connexivum and ventral segments narrowly edged with yellow. Valve half the length of the last ventral segment; plates nearly three times the length of the valve, punctured, obtuse, suture straight, outer edge feebly convex; pygofers exceeding the plates, pale, as is the apical half of the plates.

British Columbia; Mountains of northwestern Colorado. Described from a fine pair received from Prof. Gillette and one male received from Mr. W. H. Harrington and labelled "British Columbia." This latter differs from the Colorado male in being more deeply coloured, with the transverse band between the eyes black, and showing two small transverse spots on the base of the front.

Mailed October 13th.





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*Published by the Entomological Society of Ontario.*

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*Editing Committee*—J. FLETCHER, Ottawa; H. H. LYMAN, Montreal;

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REV. C. J. S. BETHUNE,

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# The Canadian Entomologist.

VOL. XXV.

LONDON, JANUARY, 1893.

No. 1.

## DESCRIPTIONS OF FOUR NEW WEST AFRICAN BUTTERFLIES.

BY W. J. HOLLAND, PH. D., PITTSBURGH, PA.

EURYPHENE, BOISD.

### 1. *E. castanea*, sp. nov.

♂. The form of the wings is exactly like that of *Senegalensis*, H-S. **UPPERSIDE.**—The ground colour is rich chestnut-brown, marked by broad black series of spots and bands. Upon the primaries these markings are as follows :—In the cell a longitudinal basal streak, a transverse line, a figure 8, a twice curved transverse line, and a broad bar at the end of the cell constricted in the middle ; below the cell there is a short basal band curving inwardly ; beyond the cell there is a wide band running from the costa toward the outer margin as far as the lower radial, and then abruptly turning and extending to the middle of the inner margin ; beyond this is a broad band of diffuse spots, wide on the costa, narrower beyond the end of the cell, and gradually widening as it approaches the inner margin ; beyond this is a submarginal series of very black round spots. The outer margin is black. All of these lines are continued upon the secondaries parallel to the outer margin, and in addition there is a narrow, submarginal black line. In the cell of the secondaries there is a round spot at the base, a figure 8, and a constricted annular mark at the end. **UNDERSIDE.**—The prevalent colour on the underside of the wings is pale fuscous, shading into ashen grey upon the cells of both wings. The markings of the upper surface scarcely reappear upon the lower side, except the submarginal band of round spots, which reappear upon the primaries as faint blackish marks, and upon the secondaries as ocelli with pale ashen margins. In both wings there are in the cell a black basal dot, a figure 8, and a narrow constricted annular mark at the end. In addition, upon the primaries the costa near the base is white, and there are a couple of small white marks at the apex ; upon the secondaries there is a narrow white bar extending from near the middle of the costa to the first subcostal nervule.

Expanse 58 mm. Habitat Kangwé, Ogové Valley.

2. *E. suffumigata*, sp. nov.

♀. The form of the wings is like that of *E. eliensis*, Hew. **UPPER-SIDE.**—Both wings are dark smoky-brown, shading into black at the apex of the primaries and clouded on the costa and cell of the primaries, with obscure black markings. There is a broad yellowish subapical band on the primaries, running from the costa and terminating before the outer margin above the third median nervule. Upon the secondaries there is a continuous slightly undulating dark brown submarginal line. **UNDER-SIDE.**—The ground colour is light green, or glaucous. The costa of the primaries at the base, the apex, the costal portion of the subapical band of the primaries which reappears upon the lower side, and a narrow bar running from before the middle of the secondaries from the costal to the first subcostal, are all white. The outer half of the wings is suffused with a fuliginous shade defined inwardly by a curved line running from the outer margin of the primaries below the apex to the origin of the third median, and thence to the middle of the inner margin, across the secondaries beyond the end of the cell, sweeping inwardly from the origin of the third median to a point above the anal angle on the inner margin. Faint traces of a submarginal band of ocelli appear upon the secondaries. Body and legs concolorous.

Expanse 75 mm. Habitat Talaguga, Ogové Valley.

This noble and well-marked species is represented in my collection by a single specimen taken in the spring of the present year. It is likely to be confounded with *E. Phantasia*, Hew., from which it may, however, be at once distinguished by the absence of the broad blue submarginal band running from above the first median nervule on the primaries to the anal angle of the secondaries in the female.

ATERICA, BOISD.

3. *A. fuliginosa*, sp. nov.

♀. Antennæ black. Body above dark brown. Underside of palpi, thorax and abdomen light grey. **UPPERSIDE.**—The ground colour of the upper side of the wings is smoky-brown, shading into dark brown near the apex of the primaries. There is a series of four minute white spots extending from the costa before the apex to the third median nervule. A broad oblique subapical yellow band runs from the first subcostal nervule beyond the cell toward the outer margin, terminating upon the first median nervule. The inner margin of this band is moderately straight; the outer margin is irregular, being indented upon the lower radial and the second

median nervules. The usual markings appear obscurely in the cell. The posterior wings are ornamented by a submarginal band of obscure ocelli running parallel to the outer margin. These spots are lighter than the rest of the wing and ringed about with dark brown, and have in the centre dark brown subhastate pupils. **UNDERSIDE.**—The underside is obscurely brownish-grey. The markings of the upperside reappear, and on the underside of the secondaries the submarginal band of ocelli is indicated by a series of minute white spots located on the inner edge of each ocellus. There are seven of these minute white spots on each secondary. The base of the secondaries has a few obscure markings characteristic of the genus, the most prominent of which is an annular mark in the middle of the cell.

Expanse of wings 68 mm. Habitat Kangwé, Ogové Valley.

I hesitated to describe this species from the solitary ♀ specimen, but it is wholly unlike the female of any species known to me, and does not exist in any of the English collections which I have consulted, and was pronounced by Mons. Mabille, to whom I showed it, as undoubtedly a new species. It comes nearest to *A. aridatha*, of Hewitson, but it is totally distinct, being much larger and quite differently coloured, and the subapical band of the primaries having an altogether different form.

EUPHAEDRA, HUBN.

4. *E. imitans*, sp. nov.

♂. Very closely allied to *E. Eusemoides* recently described by Smith & Kirby, but readily distinguished from that species by the fact that the yellow spots on the middle of the primaries are not widely separated as in *Eusemoides*, and that the base of the primaries is adorned by a number of *blue spots*, and that along the inner margin of the primaries there is a *long yellow streak*. The secondaries have a *yellow spot on the base and three black spots in the cell*, and the broad black border is interrupted by a *marginal series of obscure geminate blue spots*. The underside has a spot at the base of the secondaries pupilled with yellow, in addition to the spots which appear upon the underside of *E. Eusemoides*.

♀. The female is like the male, but much larger, and the marginal blue spots upon the upperside of the secondaries are brighter and larger.

Expanse ♂, 58 mm.; ♀, 85 mm. Habitat Talaguga, Upper Valley of Ogové.

Represented in the collection of the author by two males and one female. It is a very close mimic of *Xanthospilopteryx longipennis*, and even more so of a species of this genus in the collection of the writer which has not yet been named.

Pittsburgh, Nov. 30, 1892.



SOME NEW ADDITIONS TO THE GENUS CLISIOCAMPA,  
CURT.

BY B. NEUMOEGEN, NEW YORK.

*C. Mus*, nov. spec.

♂. Head, palpi and thorax whitish gray. Antennae brown, with whitish stems. Abdomen gray, intermixed with black hair. Primaries dark gray, with veins indicated more or less by white. A broad blackish transverse band between two whitish lines, which are slightly toothed at intersections of veins. Basal space whitish, with black tings along costa. Fringes gray, with brown accentuations at terminus of subcostal and median veins. Secondaries dark chestnut-brown, fading into whitish tinges along anal margin and in basal space. A faint, whitish mesian line. Fringes gray and brown alternating.

Below. Primaries dark brown, dusted with gray in submarginal space and along costa. The outer transverse line well marked. Secondaries whitish gray. The mesian line well curved and prominent. Legs brownish-gray. In some specimens there is a shading from gray into light brown, and the white veins are less prominent on upper surface of primaries.

♀. Antennae, head and thorax whitish gray. In some specimens exceptionally blackish-brown. Abdomen whitish gray. Primaries dark gray. A broad, blackish transverse band enclosed in white transverse lines, slightly toothed at veins. The latter appear as white horizontal lines, in crossing this band. Basal space whitish. Fringes as in ♂. Secondaries of chestnut colour, fading in basal space, with black dashes, especially along costa. Fringes alternately brown and gray.

Below. Primaries and secondaries light chestnut-brown, slightly dusted with gray granules. Basal spaces of whitish tinge. The outer transverse line of primaries indicated in dark brown. Legs and abdomen yellowish-gray, dusted with black.

Types, ♂ ♂ and ♀ ♀. Coll. B. Neumoegeen. .

Expanse of wings: ♂ 24-25. mm.; ♀ 36-37. mm.

Length of body: ♂ 8. mm.; ♀ 10. mm.

Habitat: Southwest Utah (about 30 specimens) and Arizona, (Prescott, one specimen.) Easily recognizable by its gray primaries with dark band, traversed by white veins.

*C. Mus*. var. *discolorata*.

♂. Antennae, head and collar dark brown. Thorax and abdomen brownish-gray. Wings light brown. The two transverse lines of primaries dark brown, with an outer tinge of yellowish.

Below. Primaries light brown. The outer transverse line well marked

in darker brown. Secondaries of a somewhat lighter tinge, with yellowish dust. Brown mesian line. Legs and abdomen dark brown.

Type, 1 ♂ from S. W. Utah. Coll. B. Neumoegen.

Raised out of a lot of about 50 typical *C. Mus* by Mr. Chr. I. Weidt. It seems to be rare.

♀. Antennae dark brown. Thorax and abdomen brownish-gray. Wings chestnut, with somewhat lighter dusting along anterior margin, and in basal space. Well marked dark brown lines encircling transverse band of primaries. Secondaries with lighter basal shades.

Below. Wings light chestnut, with grayish granules along anterior margins and basal spaces. Outer transverse line of primaries, and mesian line of secondaries slightly indicated.

Types coll. B. Neumoegen.

Several specimens raised by Mr. Weidt in S. W. Utah, and one specimen from Prescott, Arizona, tallying with the foregoing, but being of somewhat lighter colour in its wings.

*C. Azteca*, nov. sp.

♂. Antennae brown. Head and thorax grayish-brown. Wings and body of a peculiar blackish-brown tint. Primaries: apex sharply pointed. A transverse band of still darker shade, the two border lines of the same especially dark, the outer line relieved by a yellow streak. Running parallel with the latter, from costa to inner margin, a subterminal undulating irregularly shaped band, giving the wing the appearance of having three transverse lines. The inner line, encircling basal space, well curved towards base; the anterior line somewhat outwardly curved in its course through median space. Secondaries uniform in colour. Fringes of both wings alternating with yellow.

Below. Legs and body grayish-brown. Wings of a lighter brown shade, powdered with yellowish grains along anterior margin of primaries and over the entire surface of secondaries. Primaries show the outer transverse line, and secondaries a well curved mesian line. Basal spaces the darkest in both wings.

♀. Blackish-brown, lighter in shade than ♂. Body concolorous. Antennae, head and thorax grayish-brown. Primaries with broad transverse band, the inner line well curved towards base and of grayish colour. The outer line grayish, somewhat bulging at centre and slightly dentated at veins. Secondaries uniform in colour, showing a faint trace of a mesian line. Fringes in both wings alternating with faint yellow.

Below. Wings uniform in colour, but of lighter tint than primaries, which show faintly the outer line of transverse band. Secondaries with a somewhat darker undulating mesian line.

Types: 2 ♂ ♂ and 2 ♀ ♀. Coll. B. Neumoegen.

Expanse of wings: ♂ 31. mm.; ♀ 36. mm.

Length of body: ♂ 6. mm.; ♀ 10. mm.

Habitat: City of Mexico and vicinity. Caught by Mr. Moonz.

This is the darkest coloured American *Clisiocampa* and easily recognizable.

## DESCRIPTION OF A NEW TOLYPE.

BY B. NEUMOESEN, NEW YORK.

*P. tolteca*, nov. sp.

♂. Antennae light brown. Eyes black. Head, prothorax and thorax snowy white. Tegulae snowy white, with black hairy centre band, connecting it with the black haired abdomen, just like in *T. velleda*, Stoll. Abdomen metallic black, clothed with long hair and long drawn out anal tuft. The latter intermixed with white hair. Primaries dark slate, especially in the interspace formed by a marginal and a double central transverse line, as well as along costa and internal margin. Veins white. A lunulate white discal spot, and whitish tinges around it. Three transverse, undulating, white lines, two of which are double, the discal space being enclosed by these double lines, and the marginal transverse line being single. The latter crosses from apex the subcostal veins in a straight line, parallel with anterior margin, but becomes undulating in traversing the median veins. A thin, dark line indicates anterior margin. Fringes light brown. Wings show iridescence in a slanting position. Secondaries dark slate, with gray fringes; anterior margin indicated by a thin black line.

Below. Palpi black below. Abdomen and legs snowy white, the latter pilose, having the tibiae dotted with black. Wings blackish slate, especially dark along costal and in basal spaces, with veins and undulating marginal lines of grayish white.

♀. Much larger and of lighter shade than ♂. Antennae, head, thorax and central thoracal streak the same as in ♂, but the hairy body snowy white, with gray segmentary tuft. The same transverse lines on primaries, the one near base and the central line, which enclose disc, being double, and only the marginal line being single. Basal area tufted with snowy white. Costa whitish. Fringes light brown. Veins white. Secondaries dark slate, with basal white tuft, a white undulating marginal line and grayish-brown fringes.

Below. Black palpi. White abdomen and legs, the tibiae with black dots. Anal portion of body covered with light brown hair. Wings slate colour with white nerves. Primaries showing the white double central and marginal, the secondaries only the marginal line. Basal areas and sections along marginal lines the darkest.

Types, 2 ♂♂, 2 ♀♀. Coll. B. Neumoegen.

Expanse of wings: ♂ 30. mm.; ♀ 45. mm.

Length of body: ♂ 10. mm.; ♀ 21. mm.

Habitat: City of Mexico and vicinity. Collected by Mr. Moonz.

This insect greatly resembles *T. velleda*, Stoll., but its transverse lines on primaries differ and it is easily distinguished by its smaller size and darker colour, especially on the secondaries.

## CAN THE DIPTERA BE CONSIDERED THE HIGHEST INSECTS?

BY C. H. TYLER TOWENSEND.

In the Nov., 1892, number of the CANADIAN ENTOMOLOGIST, pp. 269-70, there is printed a paper which was read by Professor H. Osborn before the Entomological Club of the A. A. A. S. at its Rochester meeting in August, 1892. It is entitled: "Honey-bee or House-fly." In this article Professor Osborn questions the view, first advanced by Hyatt and Arms, that the Diptera are to be considered the highest insects. At the end of the paper appear the following remarks, which were made at the time the paper was read before the meeting:—

"Mr. Smith thought that the line of argument adopted by Messrs. Aldrich and Townsend was inconclusive, and that the article referred to carried with it its own refutation. He thought Mr. Osborn was correct in that the orders should be placed parallel, but that groups or families were more highly developed in some orders than in others. Mere specialization is never a test of rank in itself, and any line of argument that places the Hippoboscidae at the head of the insects as the highest in rank is simply unworthy of attention, since it omits the intellectual or nervous development as a factor."

The over-confident and assuring manner in which the above paragraph disposes of the subject is rather ludicrous. One might fancy the question finally answered, and consigned to oblivion. I feel safe in saying that such a hasty and incompetent dismissal of the subject will command little attention from anyone who is well informed in insect embryology.

Professor Osborn's paper simply makes the point that there are objections to attempting an expression of lineal rank or descent in groups of animals, but that the orders of insects are divergent, or more or less parallel developments from a common form.

The writer, in his note on the subject in *Science* (June, 1892), did not attempt to express the idea that the orders of insects led up in a natural or any other series to the Diptera; nor is any such view held by Hyatt and Arms, or Professor Aldrich, in what they have written on the subject. I desire to say also that I have not in any way upheld the view that the Hippoboscidae should be considered the culminating point, but have rather pointed to the cyclorrhaphous families as occupying that position.

It is very conclusively shown by Hyatt and Arms, *Insecta*, pp. 273-4,

287-8, that the Diptera are by far the most specialized insects, and that they should therefore be considered the highest in rank. If any one still doubts that they are the most specialized, he may be referred to the late edition of Lowne's Anatomy etc., of the Blow Fly, part I., Oct., 1890. The wonderful development of the muscid pupa from the imaginal discs, all the larval organs undergoing disintegration, is not paralleled in any other order of insects. I contend that specialization, as deduced from the ontogeny of the insect, is the best and only reliable criterion of rank. Let those who believe otherwise point out a better one. To talk of an intellectual development in insects is absurd. I do not admit that the actions of the social hymenoptera are in any way actuated by reason or intellect. It is, rather, inherited habit.

As to the ubiquitousness of the House-fly, this is rather a point in its favour. It has, entirely on its own resources, become emphatically cosmopolitan, and even man "in all his glory" is unable to reduce its numbers, or in any way to cope with it. On the other hand, the Honey-bee has for ages been cultivated, cared for and protected by mankind. Yet I would not by any means suggest the House-fly as the climax of insect development.

Man is the highest animal, because of his immense cerebral specialization. There is no such contrast in cerebral development between the lowest and highest insects as there is even between the anthropoid apes and man. Consequently I believe that the same factor should not be used as a criterion of rank in insects. At the same time, man is farthest removed from the ancestral mammalian form in his general structural development, as deduced from his ontogeny, and this can and should be used as the basis of argument, not only in insects, but in all other groups of animals.

This line of reasoning puts the Diptera at the head of the insect body, inasmuch as their larval stages show greater specialization or development than the larvæ of any other order of insects, while their perfect form points them out still more emphatically as the farthest removed from the ancestral thysanuriform type.

If there is an objection on the part of some to the term "highest", let the expression "most specialized" be substituted therefor. I cannot help believing that the use of the latter would be preferable.

## A NEW ARRANGEMENT OF THE COLEOPTERA.

BY WM. HAMPTON PATTON, HARTFORD, CONN.

Coleoptera may be described as Mandibulate Insects, with the forewings horny and the two basal abdominal joints invisible on the venter.

A reduction in the number of abdominal joints at the tip and in the number of joints in the tarsi indicates advancement in rank among Coleoptera. Likewise, a specialization of the antennae to clavicorn or lamellicorn indicates advancement, as well as does the degradation of the larva. The Lampyridæ are the lowest in rank, shown by their lax structure. The Heteromera and Phytophaga show high development in the specialization of their tarsi. The Rhynchophora are especially aberrant, and there is evidence of advanced type shown in the low development of the apodous larvae, greatly specialized prosterna and concealed ventral segments. A few Heteromera, the Buprestinae and the Lamiinae resemble them in their larvae. The larvae of Bruchidae are similar to those of *Brenthus* and *Anthribus* in their minute legs. The Weevils may be placed ahead of the other Coleoptera, although the Chafers are nearly as high.

The Cicindelidae present a character not elsewhere found in the Dolichogastres, *i. e.*, a dilation of the metapleura. A similar, but more extended, dilation is characteristic of the Rhynchophora and Phytophaga.

The arrangement below is verified in the preceding paragraphs.

## SYNOPSIS OF COLEOPTERA, TWO SERIES.

DOLICHOCASTRES.—Six or more ventrals visible (exc. Elateridae and Buprestidae).

= Metapleura not widened (exc. Cicindelidae). Pentamerous (Normopleura).

First visible ventral entire. Series *Serricornia* (Malacodermes, Sternoxi). Series *Monilicornia* (Brachelytra).

First visible ventral divided by the coxæ. Series *Filicornia* (Adephaga).

BRACHYGASTRES.—Only five ventrals usually visible.

= Metapleura not widened. Six ventrals in many families (Normopleura).

Heteromeric. Series *Heteromera*. First visible ventral not divided by coxæ. Antennae various.

Pentamerous.

Series *Clavicornia* (Philhydrida, Necrophaga).

Series *Pectinicornia*. Series *Lamellicornia*.

= Metapleura widened (Tetramera). Never more than five ventrals.  
(Platyleura).

Series *Phytophaga*.

Series *Rhynchophora*.

The conclusion which may be drawn from this synopsis is that the Tetramera are the equivalent of all other beetles taken together. Those who follow LeConte's views would place the Rhynchophora apart from all others; then the division would be into Tetramera and Pentamera, the last including the Heteromera and Trimeria.

#### A GENERAL SUMMARY OF THE KNOWN LARVAL FOOD-HABITS OF THE ACALYPTRATE MUSCIDÆ.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

In a short paper published in the Trans. Kans. Acad. Sci., Vol. XIII., on the occurrence, in a single restricted locality in Arizona, of a species of *Micropeza*, I gave a very brief resumé of the food-habits of some of the better known families of Acalyptrate Muscidæ, with the view of suggesting the possible habit of the species there considered. This prompted me later to bring together all available notes on the subject. As these small flies are of much economic importance, both as being injurious and beneficial, I have felt that a quite complete summary of their larval food-habits would be of much use to the working entomologist, besides being of no little importance to those who may be making a special study of the diptera. I should acknowledge drawing a considerable number of the notes from Schiner, Westwood and other European authors. All such refer to European species, but often apply equally as well to American species, when such exist in the genera named. All are of importance as indicating the great range and variety of the food-habits in this section of the Muscidæ. The only families of whose larval habits nothing seems to be known are the *Micropezidæ*, *Phycodromidæ*, *Opomyzidæ*, *Leiopsidæ*, *Asteidæ* and *Geomyzidæ*.

According to their habits, the larvæ of the Acalyptratæ may be grouped in three categories: Scavengers, phytophagic species, and entomophagic or parasitic species. These groups may be separated into sub-groups, as will be seen from the accompanying synoptic view:

*Synopsis of larval habits of the Acalyptrate Muscidae.*

|                                                           |   |                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scavengers.                                               | { | Coprophagous species or dung-feeders.                                                                                                                                                                                                                              |
|                                                           |   | Feeders on decaying vegetable matter. { <ul style="list-style-type: none"> <li>In decaying fruits.</li> <li>In decaying wood and under bark of trees.</li> <li>In decaying plants and leaves.</li> <li>In decaying roots and tubers.</li> <li>In fungi.</li> </ul> |
|                                                           |   | Feeding in fluids. { <ul style="list-style-type: none"> <li>Salt or alkaline water and mud.</li> <li>Urine.</li> <li>Vinegar.</li> <li>Sap from wounds of trees.</li> </ul>                                                                                        |
|                                                           |   | Feeders on animal matter. { <ul style="list-style-type: none"> <li>Cheese.</li> <li>Animal fats.</li> </ul>                                                                                                                                                        |
|                                                           |   | Gall makers.                                                                                                                                                                                                                                                       |
| Phytophagic species.                                      | { | Fruitfeeders { <ul style="list-style-type: none"> <li>Infesting soft fruits.</li> <li>Living in pods, seeds and berries.</li> <li>Living in flower heads.</li> </ul>                                                                                               |
|                                                           |   | Leaf miners. { <ul style="list-style-type: none"> <li>In water plants.</li> <li>In foliage of trees and land plants.</li> </ul>                                                                                                                                    |
|                                                           |   | Feeders in stems of plants and holms of grasses.                                                                                                                                                                                                                   |
|                                                           |   | Root feeders.                                                                                                                                                                                                                                                      |
|                                                           |   | Feeding in seaweed.                                                                                                                                                                                                                                                |
| Entomophagic species, or group with a parasitic tendency. | { | Parasites ? { <ul style="list-style-type: none"> <li>In scales.</li> <li>In plant lice.</li> </ul>                                                                                                                                                                 |
|                                                           |   | Pseudo parasites ? { <ul style="list-style-type: none"> <li>On scale insects.</li> <li>On plant lice.</li> <li>On larvæ.</li> </ul>                                                                                                                                |
|                                                           |   | Inquilines in bees' nests.                                                                                                                                                                                                                                         |
|                                                           |   |                                                                                                                                                                                                                                                                    |
|                                                           |   |                                                                                                                                                                                                                                                                    |

*Summary of larval habits.*

## Fam. CORDYLURIDÆ:

Norellia spinimana ; larva found on an anthomyiid larva (Bremi).

Cleigastra apicalis ; larva in noctuid caterpillar (Boié). *Cl. suisterci* ;  
bred from larvæ in swine dung (Townsend, CAN. ENT.)

Scatophaga ; larvæ in dung and human excrement, also in water (Sch.).

## Fam. THYREOPHORIDÆ:

Thyreophora ; larvæ found in anatomical preparations (Rob. Desv.)

## Fam. HELOMYZIDÆ:

Helomyza ; larvæ in fungi and truffles (Westw.)

Leria serrata ; larvæ in dung (Bremi), in fungi (L. Dufour).

Thelida ; a species on bat dung (Rob. Desv.)



**Fam. HETERONEURIDÆ :**

Clusia ; pupæ in mouldered tree trunks (Staeger).

Heteroneura ; larvæ and pupæ under bark of trees and in decaying tree trunks. *H. albimana*; bred by Schiner from pupæ found in trunk of a weather-beaten willow.

**Fam. SCIOMYZIDÆ :**

Dryomyza ; larvæ in fungi (Meq.)

Actora ; breeds in seaweed (Boh.)

Tetanocera ferruginea ; larvæ live between the leaves of Lemna and Callitriche in water (L. Dufour).

**Fam. DORYCERIDÆ :**

Dorycera ; larvæ live amongst leaves of water plants, several species being subcutaneous (Westw.) *D. graminum*; larvæ in water (Geoffr.)

**Fam. PLATYSTOMIDÆ :**

Platystoma umbrarum ; larvæ live in decayed wood underground (Perris).

**Fam. ORTALIDÆ :**

Herina (Ortalis) frondescentiæ ; larvæ feed on pulp of cherry (Réaumur).

Tritoxa (Ortalis) flexa ; larvæ live in onions.

Psairoptera ; larvæ of a species found under bark of Pinus, and Populus tremula (Sch.)

Chloria (Ulidia) demandata ; larvæ in old horse dung, where they passed the fall and winter (Bouché).

Chaetopsis aenea ; bred from larvæ found July 5 burrowing in the centre of a stalk of corn (Gillette).

**Fam. LONCHÆIDÆ :**

Lonchæa nigra ; larvæ in the stems of Verbascum, Angelica and Carduus. *L. parvicornis*; larvæ in suckers of Triticum repens, on which they cause galls with a scale-like covering, the dead leaf-sheath (Perris). *L. lasiophthalma*; larvæ under similar circumstances on suckers of Cynodon sp. Larvæ of other species under bark of trees (Giraud).

**Fam. SAPROMYZIDÆ :**

Sapromyza ; larvæ under decayed leaves (Bouché), in rotten straw (Perris), and in fungi (L. Dufour).

**Fam. TRYPETIDÆ :**

Platyparea ; larvæ of a species in asparagus (Sch.)

Euphranta ; larvæ of a species in pods of Vincetoxicum officinale, pupating in the earth (Giraud).

Aciura femoralis ; bred from larvæ found in Phlomis fruticosa (v. Frauenfeld).

Acidia ; larvæ of a species in leaves, which they mine (Sch.) Larvæ of another species in fruit of Lonicera xylosteum (Lev.) *A. artemisia* ; larvæ mine leaves of Chrysanthemum (Westw.)

Spilographa ; larvæ in fruits or berries, while some mine leaves (Sch.) *S. alternata* ; larvæ in berry of Rosa villosa (Bouché, quot. by Westw.)

Orellia wiedemanni ; larvæ live in leaves of Bryonia (Sch.)

Trypeta ; larvæ of many species live in flower heads of various compositæ.

Rhagoletis (Trypeta) pomonella ; larvæ in apples (Wlsh.)

Acrotoxa (Trypeta) ludens ; larvæ in oranges (Riley).

Eurosta (Trypeta) solidaginis ; larvæ in galls on stems of solidago (Fitch).

Urophora ; larvæ of many species live in various parts of composite plants (Sch.) *U. cardui* ; larvæ in large galls on thistle (Westw.)

Myopites ; larvæ in flower-heads of Mula sp. (v. Frauenf., v. Roser).

Ensina sonchi ; larvæ live in flower-heads of Sonchus, Apargia, Senecis, Tragopogon, Podospemum (Sch.), Carduus (v. Frauenf.)

Carphotracha ; larvæ live in Compositæ, preferably Ligulifloræ (Sch.)

Euleia onopordinis ; larvæ mine in leaves of celery (Westw.)

Oxyphora ; larvæ in flower-heads of various Compositæ (Sch.)

Tephritis ; larvæ in flower-heads of Compositæ (Sch.)

Anomoia ; larvæ of a species in berries of Crataegus oxyacantha (Sch.)

Ceratitis capitata ; larvæ in peaches, oranges and other citrus fruits (Westw.)

Dacus oleæ ; larvæ in olives, two or three larvæ in a fruit, pupating in the earth.

*Eutreta diana* ; larvæ in gall on wild sage, *Artemisia tridentata*, in Mo. (Riley, Osten Sacken).

*Straussia* (*Trypeta*) *longipennis* ; the fly oviposits in stalk of *Helianthus* (sunflower) near tip, in June and July (Lintner, 3d. Rep.)

Fam. SEPSIDÆ :

*Nemopoda cylindrica* ; larvæ in human excrement (Bouché, West., Sch.)

*Themira putris* ; larvæ in slimy water and mud (Sch.)

Fam. PIOPHILIDÆ :

*Piophila* ; larvæ in cheese, ham-fat and fatty animal matter in general (Swamm.). In salt (Germer).

Fam. PSILIDÆ :

*Chyliza leptogaster* ; bred from irregular galls the size of a walnut on the stems of *Spiræa opulifolia*—not known that the galls were caused by these flies (Scholtz).

*Psila rosæ* ; larvæ in roots of *Daucus* (carrot) and *Brassica* (Sch.)

Fam. OSCINIDÆ :

*Platycephala* ; pupæ of one species in reed stems (Boié)

*Meromyza americana* ; larvæ in stems of wheat, rye and probably in grasses (Riley, Webster and others).

*Chlorops* ; larvæ of several species live in holms of grasses and cereals. *Chl. pumilionis*, *Chl. glabra* ; larvæ injuring wheat (Bjerkander, Westw.)

*Chloropisca prolifica* ; supposed by Dr. Lintner to breed in grass of lawns (7th Rep. N. Y. Ent., p. 239).

*Lipara* ; larvæ in reed stems, causing large galls near the tops, in which they pupate (Sch.)

*Oscinis* ; larvæ live in holms of grasses and cereals. *O. frit* ; larvæ in husks of barley in Sweden (Linn.) Species in wheat in U. S. (Garman, Webster).

*Siphonella* ; larvæ in grasses, also in other plants (Sch.) Two species in flower-heads of various *Cynerocephalæ* (Egger, v. Frauentf. Larvæ of one species in worm-eaten nuts, in company with curculionid larvæ (Perris, v. Frauentf.)

*Elachiptera* ; pupæ on a species in large quantities under the bark of old poplars (Sch.)

Gampsocera; larvæ in decayed stems of Althea (H. Heeger).

? Novum genus; bred in California from a spider's egg-mass.

Fam. EPHYDRIDÆ:

Halmopota; larvæ in salt-pits (Bouché).

Ephydra; larvæ in salt-pits (v. Heyden), in salt-pits of Kissingen (Diruf). *E. californica*; larvæ live in great numbers in water of alkaline lakes in the south-western U. S. (Packard, Williston). *E. hians*; larvæ in immense numbers in water of Lake Tezcuco, in Mexico, and are used by the Mexican Indians as food. It may also be mentioned that the larvæ of *E. californica* are used by the Pah-Utes as food (Williston).

Teichomyza fusca; larvæ live in urine (Rob. Desv.)

Fam. DROSOPHILIDÆ:

Aulacigaster; larvæ of only species found in wounds on elm trees (L. Dufour).

Gitona; larvæ of only species live in flower-heads of Sonchus arvensis (Loew), probably also in flower-heads of Onopordon (Sch.)

Drosophila; larvæ usually in sour-fermented matter, fermented liquids, vinegar, decayed fungi, ulcerated wounds of trees, decayed fruits (Sch.) *D. ampelophila*; larvae in pomace of cider mills, in pickled and preserved fruits (Lintner), bred from maggots found hollowing out grapes (Forbes). *D. quinuria*; bred from a mass of cochineal insects (Riley & Howard). Some species (Scaptomyza Hardy) are leaf-miners (Sch.) One or more species mine turnip leaves in Europe and U. S. (Curtis, Garman).

? Stegana; breeding in hen dung (Riley & Howard, Ins. Life, II., 254). It is perhaps doubtful whether this fly belonged to the Drosophilidae.

Fam. OCHTHIPHILIDÆ:

Leucopis; larvae parasitic (?) on plant lice and scale insects, (?) in spiders' nests (Sch.) *L. bellula*; reared from cochineal insect (Riley & Howard). *Leucopis* sp.; parasitic (?) on Rhizococcus sp. on grasses in Nova Scotia (Fletcher).

Lestophonus iceryae; parasitic (?) on Icerya (Riley).

**Fam. MILICHIDÆ :**

*Cacoxenus indagator* ; larvae live in nests of *Osmia emarginata*, consuming the food prepared for the *Osmia* larvae and causing them to die (Giraud). Probably found in other bees' nests (Sch.)

**Fam. AGROMYZIDÆ :**

*Agromyza* ; larvae are leaf-miners or live in pith of plants (Sch.) *A. tritici* ; bred from larvae crawling in large numbers from unthreshed wheat in a barn (Fitch).

*Ceratomyza* ; larvae of one species mine leaves of *Sonchus oleraceus* (Sch.)

**Fam. PHYTOMYZIDÆ :**

*Phytomyza* ; larvae are leaf-miners (Sch.), some species pupating in the parenchyma of the leaf (*Chromatomyia* Hardy). *P. chrysanthemi* ; larvae mine leaves of *Chrysanthemum*, *Tanacetum*, *Eupatorium*, *Gazania*, *Helianthus*, *Cineraria* (Lintner). *P. lateralis* ; larvae live in heads of *Anthemis*, *Pyrethrum*, and in stems of *Centaurea*, *Verbena* and *Urtica* (Kaltenbach), mining in *Sonchus* (Goureaux). *P. flava* ; larvae in subcutaneous mines in leaves of *Scolopendrium vulgare*, a fern (Doubleday). *P. flaviceps* ; larvae mine leaves of woodbine (Hal.) *P. obscur-ella* ; larvae mine leaves of holly (Hal.), in honey suckle (Glover). *P. nigricornis* ; larvae mine in underside of leaves of turnip, peas, forming long galleries in parenchyma beneath lower cuticle, pupating at end of gallery (Curtis), also mine leaves of monkshood, *Aconitum* (Kaltenbach).

**Fam. BORBORIDÆ :**

*Borborus* ; larvae in dung and decayed fungi (Haliday).

*Sphaerocera* ; larvae live in horse dung (Sch.)

*Limosina* ; larvae of a species in *Confervae*, in diseased potatoes, and in fungi (Sch.)

NOTE.—If any genera whose larval habits are known have been omitted, or if any peculiarity in habit of a genus here mentioned is not included, the author will be glad to know of the references or observations. The list is not supposed to be complete.

LARVÆ OF PAPILIO PHILENOR BECOMING LARVO-  
PHAGOUS.

BY RICHARD E. KUNZE, M. D., NEW YORK.

"I perish by my art; dig mine own grave;  
I spin the thread of life; my death I weave."

Truly wonderful is the adaptability of some individuals when placed under circumstances tending to diminish the reproduction of their race. Desirous of raising larvæ of *Papilio philenor*, I planted two years ago five vines of Dutchman's Pipe (*Aristolochia siphon*) in my back yard, which in the summer of the present year (1892) covered a wall and fence 16x7 feet with luxuriant foliage.

July 2nd a friend brought me, from Staten Island, N. Y., from 125 to 150 larvæ of *Philenor*. The majority had passed their first, and a few their second moult. All were transferred to the leaves of the Dutchman's Pipe vine in my garden plot. By the ninth of July nearly all the leaves of my Pipe vines were devoured, before less than half of the leaves were full grown. I then removed fifty of the largest to a five-gallon flower pot, covering the bottom with a layer of loam, and filling up this breeding cage with as many leaves of *Aristolochia siphon* as it would hold. The pot and loam were first well sprinkled with water to furnish moisture for stems of *Aristolochia* vines, and the top covered with thick manilla paper to prevent evaporation, inasmuch as the porosity of the cage answered every such purpose. Two days later the leaves of breeding cage were all devoured, and those on my vines in the garden nearly so. I divided what remained of the latter, and gave an equal share to larvæ in the cage. Exactly forty-eight hours afterward the Pipe vines of the garden were entirely defoliated, and the larvæ contained in the flower pot nearly all transforming into chrysalids.

Two days previously I requested my friend, Mr. Ehrenberg, who furnished the larvæ, to procure me a supply of *Aristolochia* leaves from Staten Island, where he officiated as landscape architect at a well-known villa, else most of our larvæ would perish. In the meantime the owner of the villa noticed the foliage of his *Aristolochia* trellis disappearing rapidly, caused by the remaining larvæ which my friend had failed to take off for me. His, (the owner's) instructions to the resident gardener to keep these larvæ well picked off had not been observed, he thought, while the landscape architect tried to raise a few more chrysalids on the trellis facing the

villa, and suggested to the gardener to defer operations a few days longer. The owner, not knowing of our intentions, became vexed and gave an Italian labourer a bagfull of sulphur, with orders to dust the *Aristolochia* with it effectually. How well the instruction was carried out may be inferred when it is known that those plagued worms, all the remaining foliage and much of the grass beneath the vines, were totally destroyed !

At the same time, while in expectation of an abundant supply of larval food, I had collected from the bare vines, wall and fences of the yard, from the passage ways of the house, and wherever they wandered in search of food, some sixty hungry larvæ. These were put into a lady's large bonnet box, and some fifteen different food plants which grew on the premises were placed therein to serve that wriggling mass of large black larvæ with long concolorous tubercles their immediate wants. But touch it they would not. On the evening of the ninth of July my friend returned from Staten Island without any food plant, and informed me of our misfortune. I knew of only two more private places in this city, and another in Astoria, Long Island, where *Aristolochia sipho* is cultivated. Not being acquainted with the owners, I could not obtain a supply.

The children of neighbours brought me numbers of my *Philenor* larvæ which had crawled into their yards and gardens. I decided to keep only the largest of these famishing larvæ, thinking to obtain a few more chrysalids while waiting for a possible supply of food plant, which, however, did not come. All others I gave liberty to go where they pleased. Many returned to the bare stem of my *Aristolochia*, where they nibbled at the epidermis of the vines until most had perished.

Necessity compelled the larvæ I had in that bonnet box to become *Entomophagous*, so to speak. Not a leaf of a plant, shrub or tree, wild or cultivated, would they eat. On the 11th of July I observed several of the caged larvæ had spun a thread of silk across their bodies and were suspended by their anal hooks from the sides of the cage. A number of other hungry larvæ were attacking and devouring their own kind which were helplessly "hung up" and could not escape from the onslaught of these carnivorous larvæ. On the next day I discovered a few chrysalids suspended from the box, which during transformation had escaped attack, while others were being devoured. But before they hardened sufficiently to permit of removal these chrysalids, too, were attacked and converted into food ! It was a disgusting and repellant sight to witness. From day

to day this larval cannibalism continued to enable a number of individuals to transform into the second stage. When the chrysalis was not at once removed it would soon disappear, excepting only the outer case. Sometimes 3 or 4 larvæ would attack a suspended larva at the same time, and whenever a dismembered portion of the victim fell to the bottom of the cage other larvæ would seize and devour it. A dozen larvæ and as many chrysalids were eaten up in four days, and not even the skin of a larva would remain. Thermometer ranged from 80° to 92° in the shade, but no sign of decomposition was noticeable in cage. It was dog eat dog, and not even bones left to tell the tale!

July the 16th only nine larvæ were left, and two chrysalids transformed the previous day were in an unsightly condition—literally disemboweled. All of these larvæ were very lively, but whenever ready to transform would never be more than two-thirds the size of those naturally fed. One more unfortunate hung by its anal feet to become the next victim in order. July the 19th three larvæ were alive, of which one was “spinning the thread of life”. I again placed 8 or 10 kinds of food plants in the cage, which in twenty-four hours were untouched. One chrysalid was left intact. I now placed the remaining two larvæ on my *Aristolochia* vines, inasmuch as a new growth of leaves was in sight. These immediately fed upon the tender food offered. A number of others, barely alive, were nibbling away at the bare vines lower down on the plants, and had not yet discovered the new foliage.

Altogether these were a most carnivorous lot of larvæ, from which I obtained only five chrysalids out of a possible twenty-five larvæ retained in that cage. From one of these emerged, in September, a ♂ imago of the normal colour, but smaller in size.

I am not aware that larvophagous caterpillars have been reported as occurring among Rhopalocera. In the *American Naturalist*, Vol. XX., page 556, it is stated that a Lycænid larva of *Feniseca tarquinius* feeds upon an Aphid which is found only on the branches of alder (*Alnus serrulata*) affecting swampy localities. One of my liberated *Philenor* larvæ fed upon a cultivated plant of *Azalea indica*, which was a potted plant fifteen inches in height. I discovered the chrysalid in September, and this was the only exception as far as I could discover where these had not fed either upon *Aristolochia siphon* or their own kind.



BY D. W. COQUILLET, LOS ANGELES, CAL.

1.—Scutellum (except sometimes its extreme base) black.....2  
Scutellum and face yellow, abdomen yellow, marked with five black  
fasciæ, wings pale yellow.....*vespoides*, Bigot

|                                                                                       |   |
|---------------------------------------------------------------------------------------|---|
| 2.—Abdominal segments one to four wholly black.....                                   | 3 |
| Abdominal segments three to six (except sometimes their lateral margins) reddish..... | 5 |

3.—Wings pure hyaline, the cross veins and furcations alone sometimes clouded with brown; tibiæ reddish.....4  
Wings more or less brown, the apex never blackish....*ludius*, n. sp.

[illegible]

4.—Pollen of abdomen extending on the bases of the segments . . . . .  
 . . . . . *senilis*, Bigot.

Pollen confined to the apices of the segments . . . . . *lautus*, Loew.

5.—Wings nearly uniform, smoky-gray; head, first two joints of antennæ, thorax and legs obscure brown.....*rubidus*, n. sp.  
Wings smoky-brown, darkest on apical half; head, antennæ and thorax black.....*patruelis*, n. sp.

*Anisopogon ludius*, n. sp. ♂. —Black, the tibiæ and tarsi dark reddish-brown. Face gently convex, white pilose, bristles of lower part black ; first joint of antennæ slightly longer than the second, the third joint tapering to the tip, three times as long as the second, the style slender, seven-eighths as long as the third antennal joint ; pile of occiput, thorax, pleura, coxæ and venter white ; upper side of each front tarsal joint with a dense covering of appressed white hairs ; upper side of middle femora toward its apex with a dense covering of short appressed black hairs, which, however, leave a large elliptical naked space between the apex and the middle ; middle tibiæ white pilose in front, and above the middle ornamented with a large patch of appressed black hairs and bristles, which form an inner and an outer fringe ; inner side of hind tibiæ near the tip, and also of the hind metatarsi, densely bright yellow pubescent ; wings smoky brown, lightest at the apex and along the hind margin ; all posterior and the anal cell open.

♀ as in the male, except that the front tarsi, middle femora and

tibiae are not ornamented as in the male, and the wings are much lighter, the brown forming a border to some of the veins. Length, 12-16 mm. Los Angeles and San Bernardino Counties, California, and British Columbia. Two males and three females, in May. The British Columbia specimen was received from Mr. W. A. Danby.

This species is closely related to *A. senilis* Bigot, but in the latter species the wings are wholly hyaline, and the appressed white hairs on the front tarsi of the male are confined to the first joint. I have specimens of the latter species from Colorado and Florida (Morrison). In both species, the colour of the bristles on the head, body and legs is too variable to be of any value in separating the species.

*Anisopogon rubidus*, n. sp. ♀.—Obscure brown, the following parts black:—The third antennal joint, basal half of style, proboscis, palpi, scutellum except its base, first segment of abdomen, basal half of second, lateral margins of the others, seventh segment and genitalia largely, apex of venter and upper side of each femur, that on the first and second segments of abdomen with a strong bluish tinge, brown of abdomen more reddish than on the other parts; thorax irregularly marked with grayish black. Head gray pollinose, the pile yellowish-white; face evenly convex, the pile extending nearly to base of antennae; first joint of antennae slightly longer than the second; third joint slightly longer than the first two taken together, tapering gradually to the apex, the style two-thirds as long as the third joint. Thorax gray and golden pollinose, the pile short, sparse, mixed black and white; pleura gray pollinose, its pile and that of the coxae white, the fan-like pile in front of halteres also white. Pile of abdomen sparse, microscopic, light-coloured, that on lateral margins and on venter longer, whitish. Pile of legs sparse, whitish, that on tarsi and tips of tibiae largely black. Wings smoky gray, all posterior cells and the anal cell open.

♂ same as the ♀, except that the middle femora have each a cluster of black pile at its apex in front and two similar fringe-like clusters, one on the upper, the other on the lower surface at its last third, and above the middle of each middle tibia are two long dense fringes of black pile on its inner and outer sides, connected with each other in front; front metatarsi destitute of appressed white pile. Length, 14 to 17 mm. Los Angeles County, Cal. Four females and one male.

*Anisopogon patruelis*, n. sp. ♂ ♀.—Same as the above description of *rubidus*, with these exceptions:—Head, antennae, thorax, scutellum and

femora, except the apex, black ; apical third of the first abdominal segment and the apical three-fourths of the second segment reddish in the female, but black in the male. Style one and a-fourth times as long as the third antennal joint. Wings smoky brown, lighter on the base as far as the furcation of the second and third veins ; a lighter transverse shade passes through the middle of the discal cell. Front metatarsi of the male densely covered with appressed white hairs above. Length, 13 to 16 mm. Texas. A single male and female received from the late H. K. Morrison.

### THE LARVA AND CHRYSALIS OF CHRYSOPHANUS DIONE.

Some time ago Mr. Henry G. Willard, of Grinnell, Iowa, very kindly sent me some of the full grown larvæ of this species. I made a few notes at the time which may be of use, owing to the fact that nothing has been published in regard to the early stages of this butterfly. The food plant at the home of the insect is *Rumex longifolius*, but they readily ate our common species of dock found here. The full grown larva were onisciform in shape, grass green in colour, and 20 mm. in length. Most of them had a narrow, claret-coloured dorsal stripe, and the entire body, under a glass, was seen to be clothed with minute black hairs. The larva is of the same general appearance as that of *Chrysophanus hypophleas*, but larger. The chrysalis is the same shape as most others in the *Lycænidæ*, and looks very much like Scudder's figure of the chrysalis of *E. thoe*. In colour the chrysalis is a light hay colour, and the dorsal abdominal segments are heavily marked with blackish blotches. The dorsal thoracic segments are peppered with black spots. The wing covers are lightest in colour of any part, but are also peppered with the fine black points. The head, eyes and shoulder-joints are covered with black blotches. One chrysalis, which I think was entirely green and without the black markings, disclosed a *C. thoe*, but I did not notice any difference in the larva I had, so I conclude the larvæ of the two species look very much alike. Mr. Willard could perhaps give us something interesting about the times of appearance and habits of this butterfly, as it is common in his locality.

HENRY SKINNER, M.D., Philadelphia.

## NOTES ON ZARÆA AMERICANA.—CRESS.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

The young larva of *Zaræa Americana* appears in the beginning of July on *Menyanthes trifoliata*. It lies curled on the underside of the leaf. Its head is black, and its body lead-colour above and greenish-white beneath. It develops into the most beautiful larva of any of the Tenthredinidae that I am acquainted with.

*Description of the full-grown larva.*—Length one and a-quarter inches. Head black. Body above lead colour—excepting the anal segment, which is greenish white. The underside and the legs are greenish-white. The forelegs are tipped with black. Along the back are eleven pairs of raised and conspicuous bright yellow spots. Between the pairs, and on either side of them, are conspicuous jet-black spots, which, taken with the yellow ones, form rows across the back. There are other rows of *smaller* black and *pale-yellow* spots—two after each row of the larger ones. The side lines are white. Above these lines, on the margin of the lead-colour, is 'a row of black dots. Beneath them, just above the legs, is a series of raised yellow spots—each spot being surmounted by one or two black dots.

The larvae were plentiful in one spot, but could hardly be said to be *gregarious*, as only one or two were to be found on a plant. Towards the end of July the larva spins around itself a closely woven, dark-brown cocoon. In the spinning it usually gathers several leaves of the plant about it. The larva remains unchanged in the cocoon till spring, when it assumes the pupal state. The fly makes its appearance in the middle of May.

*Description of the perfect insect.*—In length the fly measures about nine-twentieths of an inch; and in expanse of wings about eighteen-twentieths. The antennae are dark brown, six-jointed and clavated. The wings are faintly clouded with brown. The head and thorax are dark brown and hairy. The abdomen, which is oval in outline, is of a rich velvety-brown above, with a slightly bronzy-green lustre. The colour fades into light reddish-brown on the sides and on the two last segments. The underside of the abdomen is pale brown. The tibiae and tarsi are white, and have a waxen appearance. The fly seems to be somewhat sluggish in its habits.

I am indebted to Mr. E. T. Cresson for the identification of the insect.

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A NEW FORM OF PRIONIA, AND NOTES ON PLATYPTERYX  
ARCUATA AND P. GENICULA.

BY GEORGE H. HUDSON, STATE NORMAL SCHOOL, PLATTSBURGH, N. Y.

*Prionia levis*, n. var. or sp.

Primaries without the delicate frosted or silvery appearance, and without the numerous short, fine, strigate, brown lines of *bilineata*. The brown scales are present, but are uniformly and evenly distributed, save where they form the two brown lines which cross the wing, and a little darker shading near the outer edge and apex. These two transverse lines are about a third wider apart than in *bilineata*, the second narrowly edged externally with the clear, pale yellow ground-colour of the wing. There is no brown submarginal line, but a wavy, pale yellow line runs from inner margin to costa, midway between the second line and the outer margin. The vestiture appears to be more dense and smooth than in the allied form. Both primaries and secondaries seem to have a more decided ochreous tint.

Underside with markings more obscured.

Described from one male taken Aug. 13, 1887, and one female taken Aug. 3, 1890; both from the electric lights.

This may prove to be a seasonal form of *bilineata*. My dates of capture for the latter, since 1886, are as follows (the figure after the hyphen giving the number of specimens). May 8, 10-2, 15-3, 19; June 16, 22-2, 30.

Mr. H. G. Dyar, while here last summer, suggested that this new form might be the one which the late Mr. Hy. Edwards (CAN. ENT., XIX, 146) referred to *P. lacertinaria*, Linn. (= *lacertula*, Den. and Scheiff.). Both *P. bilineata* and *P. levis* are distinct from the European form, although very closely allied to it. Mr. Dyar also called my attention to the fact that this form seems to vary somewhat after the manner of *Platypteryx genicula* from *P. arcuata*, as pointed out by Dr. Packard in "Proceedings of the Boston Soc. Nat. Hist.," Vol. XXIV., page 491, 1890. We separated the two forms and then looked up the dates of capture, with results as follows:—

*Platypteryx arcuata*.—May 10-2, 11, 16-2, 19, 21-2, 24; June 1-2, 3, 9; July 27.

*P. genicula*.—July 7, 13, 27-3, 28-2, 31-2; Aug. 2-4, 3-2, 14.

## FEMALE OF CROCOTA ROSA, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

In describing this species in Vol. XXII., page 133, of the CANADIAN ENTOMOLOGIST, I had before me two males, one from Texas and one from Ohio. I have now before me a fine fresh female from Champaign, Ill., the first of this sex I have seen, and I will give here some additional characters of the species. The forewings are fawn, a little darker than in the type, but the latter was evidently a little faded. The hindwings have a few dusky scales in the outer border near the anal angle. On the forewings the veins are a trifle darker than the spaces between the veins, but only from the wing being thicker here. Antennae a shade darker than the forewings; a semi-ring back of the eyes that is red tinted, as also the underside of the palpi; upper side of tibiae a little more red tinted. Abdomen above concolorous with the hindwings, an obscure row of dorsal dusky spots; whole of underside of body concolorous with upper side of forewings.

## CORRESPONDENCE.

## A CORRECTION.

Sir,—On page 225, CAN. ENT., 1892, I described a new Bombycid genus, *Melia*. Finding that this name is preoccupied, I have changed it to *Eumelia*, calling the insect proper *Eumelia Danbyi*, Neum.

B. NEUMOESEN.

## HONEY-BEE OR HOUSE-FLY.

Sir,—The November number of your journal contains upon its first and second pages some rather misleading comments on an article of mine in *Science*, of April 29. There was nothing in the article to justify the intimation that I had arranged any insects in a "linear series." The article was in the main a re-statement of Hyatt and Arms's view of the systematic position of the Diptera. To this I added several considerations tending to reinforce their conclusions. I referred to their placing "the Hymenoptera second and the Lepidoptera third," but this does not necessarily imply anything "linear." See their book "Insecta."

So far am I from holding the views imputed to me that I prefer not to regard any of the groups as representing "parallel branches," believing that "we should make an effort to avoid the expression of lineal rank in groups of animals."

I purposely based my conclusions upon anatomy alone, because, as I said, "to introduce the subject of instinct or of usefulness to man, is to confuse our ideas, for we cannot translate the data furnished by such a criterion into terms of the other standard." Judged from that position, it is very much out of the way to assert that "mere specialization is never a test of rank in itself." All that I tried to show was that, anatomically considered, the Diptera are the most highly specialized order.

I trust that it is not out of place to add that the author of one of our principal introductions to entomology, a man whose opinions have as great weight as anyone's in this country, informed his class in entomology last summer that he had come to the conclusion that the Diptera are the highest order. I was so informed by one of his students.

J. M. ALDRICH.

Brookings, South Dakota, Nov. 11, 1892.

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#### NOTES.

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##### MELANCHROIA CEPHISE, HÜBN

The genus *Melanchroia* has been associated in our lists with *Gnophaela* to form a family *Pericopidae*. As a matter of fact it is a veritable geometer, with little more relation to *Gnophaela* than is expressed in the statement that both are Macro-Heterocera! This has, indeed, been recognized in Europe, and Mr. Butler, when identifying my specimens as *M. cephise*, added the remark "belongs to the geometrites".

*M. cephise* is very common in Kingston, Jamaica, and on Aug. 5, last year, Mr. Bowrey kindly gave me a number of the larvae. These were of the usual form of geometrid larvae, and from them I drew up the following description:—

*M. cephise*: Larva about 22 mill. long, body smooth, with a few short hairs, which are hardly visible without a glass. Head yellow-brown, the mouth parts dark. Thoracic legs yellow-brown. Abdominal legs tinged yellow-brown. Body pale yellow, with a black ring on each segment, which extends downwards only as far as the infraspicular line (except that on the 4th body segment, which is continuous below). These rings are broad on the 4th to 8th body segments, but rather narrow on the others. There is a longitudinal, narrow black subdorsal line, and a black infraspicular line, which broadens into triangles (which are spotted with white) at the junctions with the black rings. The edges of all these black bands are whitish.

The very young larvae are marked in similar way to those which are mature. The pupa is brown and rather shiny. The moths began to emerge on Aug. 15th.

T. D. A. COCKERELL,

Institute of Jamaica, Kingston, Jamaica.

## HALISIDOTA MACULARIA, WALK.

I find on further search that *H. macularia*, Walk. (see CAN. ENT. Vol. XXIV., p. 306), is made a synonym of *Alpenus maculosus*, Stoll., whose habitat is given as West Africa. The citation of it from North America can only be the result of an error. The occurrence of *Halisidota megapyrrha*, Walk. (= *Ammalo helops*, Cram.), is also doubtful, though not so much so, as its home is in Surinam.

HARRISON G. DYAR, Roxbury, Mass.

## ASTATUS BICOLOR, SAY.

In the excellent synopsis of the difficult genus *Astatus*, by Dr. William J. Fox, published in the September number of this journal, I believe that gentleman to be in error as to his identification of *A. bicolor*, Say. This is an undersized species, not uncommon in Illinois, having the stigma and the contiguous portion of the submarginal vein of a yellowish rufous colour—"pale rufous", Say writes—and not black, as Dr. Fox states; the legs black, as usual. The species described by Dr. Fox as new, under the name *pygidialis*, appears from the description to agree closely with *bicolor*, scarcely differing except in the rufo-testaceous colour of the legs and on the clypeus and antennal scape, which parts are black in *bicolor*. It is possibly an extreme variety of the latter species. I would arrange the synonymy of this group as follows:—

*ASTATUS RUFIVENTRIS*, Cress.

♀ *rufiventris*, Cress. Trans. Amer. Ent. Soc. IV., p. 218.

*bicolor*, Fox. CAN. ENT. XXIV., p. 232.

*A. BICOLOR*, Say.

♀ ♂ *bicolor*, Say. Lec. Ed., I., p. 166.

*terminata*, Cress. Trans. Amer. Ent. Soc. IV., p. 218.

*A. PYGIDIALIS*, Fox.

*pygidialis*, Fox. CAN. ENT. XXIV., p. 234. (♀ = var. of *bicolor*.)

CHARLES A. HART, Champaign, Ill.

## BOOK NOTICES.

HISTOIRE NATURELLE DES ARAIGNEES : Deuxième Edition, Par Eugène Simon : Librairie Encyclopédique de Roset, Paris, 1892.

The first portion of Vol. I. of this most important work has just appeared (pp. 1-256). The work will be divided into four parts : 1. External Anatomy ; 2. Classification ; 3. Biology ; 4. Geographical Distribution. Simon arranges the known spiders of the world in 41 families ; three families under the suborder *Araneæ theraphosæ* ; the remaining families under *Araneæ verae* ; the latter is divided into two



sections—the *Cribellata*, with eight families, the *Ecribellata*, with thirty families. This portion of Vol. I. contains the External Anatomy and the classification of the *Araneæ theraphosæ* and the *Cribellate* section of the *Araneæ veræ*. The text is illustrated with outline figures. There is no key to the families, but under each family there is a key to the genera, after which follow descriptions of the genera and various remarks. The descriptions of the genera and the keys are in Latin; the rest in French. Although the classification will, of course, change from time to time, this work will be for many years to come a most important work for arachnologists, and should be found in every college library throughout the world.—N. B.

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A SYNONYMIC CATALOGUE OF LEPIDOPTERA HETEROCERA (MOTHS) by W. F. Kirby, F. L. S., F. E. S., etc., etc.: Vol. I., Sphinges and Bombyces. London: Gurney and Jackson, 1 Paternoster Row: 1892.

This forms a large volume of 950 pages, including the Sphinges and Bombyces of the world, and brought down to May 1, 1892. There are twenty-nine families recognized, of which the Sphingidæ form the twenty-first, preceded by the Notodontidæ and followed by the Bombycidæ. The Castniidæ head the list, including as the only North American species, the genus *Megathymus*, heretofore classed among the butterflies. The genus *Lagoa*, which Dr. Packard has recently proposed should form the type of a new family, is placed in the Liparidæ, between *Parorgyia* and *Orgyia*, a most peculiar location. A number of names, long since referred to the synonymy, reappear under their original generic titles in a very misleading manner, as, for example, *Arctia bimaculata* Saunders, placed between *A. f-pallida* Stets. and *A. Nais* Dru., in the genus *Apantesis* Walk. One would hardly look for *Crocata quinaris* here. On page 36 is a curious error, whereby the noctuid genus *Euedwardsia*, Grote, proposed for *Xanthotrix Neumoegeni*, Hy. Edw., is made to stand for *Edwardsia brillians*, Neum. As both generic names are thus pre-occupied, the Agastid genus may be known as *Eupseudomorpha*. But errors of this kind are hard to avoid in a work of the size of this one; and the arrangement of the moths of the world under a uniform system of classification makes possible a revision of our North American species to correspond with it. The correction of certain errors in the location of species, with which Mr. Kirby is necessarily autoptically unacquainted, can easily be made, and Mr. Neumoegen and myself have already started on this work.

HARRISON G. DYAR.

---

Mailed January 5th.

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## EXCHANGE.

*Subscribers are invited to make liberal use of this column. Notices over three lines are liable to be shortened if necessary. All insertions free to subscribers.*

HYBRID COCOONS ex *Ceanothi* et *Cecropia* now for sale or exchange for rare, perfect *Sphingide*, *Arctiide*, *Bombycide*, *Catocala* and *Diurni* not in my collection. DR. RICHARD E. KUNZE, 606 Third Avenue, New York.

WANTED.—Coleoptera and Lepidoptera from all sections. Will exchange works on Entomology, Zoology, Botany, and works relating to the languages of the N. A. Indian. Send for list. WM. D. DOAN, Box 377, Coatesville, Penn.

HESPERIDÆ.—A few *P. viator*; also *P. dion* and *Graptia j-album* to exchange for desirable Hesperidæ. H. E. WILFORD, Batavia, N. Y.

EXOTIC ICHNEUMONIDÆ.—Would like to exchange North American Ichneumonidæ for correctly determined exotic species of the family. G. C. DAVIS, Agricultural College, Ingham Co., Michigan.

DUPLICATES.—A large number of correctly named and well-set British Coleoptera, also British Lepidoptera (unset). DESIDERATA.—Correctly named types of American and Canadian Coleoptera and Diurni. ARTHUR FORD, Glenmount, 107 Braybrooke Road, Hastings, Sussex, England.

WANTED.—*Amblychila cylindriformis*, *Lucanus elaphus*, *Tatracha virginica*. Will give liberal exchange for them in European Lepidoptera in papers; have also perfect specimens stretched of *Acherontia Atropos*, *Saturnio pyri*, etc. Address, R. J. WEITH, Elkhart, Ind.

WANTED—I wish to obtain any Entomological Literature, especially that treating of Coleoptera, not already in my possession. In exchange for such, in any language, I offer good material from the West and far North, especially Coleoptera. H. F. WICKHAM, Iowa City, Iowa.

PROF. J. B. SMITH, New Brunswick, N. J., is engaged in a monographic revision of the Deltoid group of the Noctuidæ, and desires material from all parts of the country. He will name and return all material sent him, for the privilege of retaining such specimens as may be needed for description or for completing the collection of the U. S. National Museum.

SPIDERS.—I wish to obtain American Spiders, and will exchange or name and return duplicate species. NATHAN BANKS, Sea Cliff, Queen's Co., N. Y.

COLEOPTERA—I have about 1,500 species in duplicate and solicit exchanges, especially in Chrysomelidæ. CHARLES W. LANG, P. O. Box 3565, New York.

MYRIOPODA.—N. A. Myriopods wanted in exchange for insects of any order in this locality. Correspondence solicited. Howard Evarts Weed, Agricultural College, Miss.

TACHINIDÆ WANTED.—Named or unnamed Tachinidæ wanted in exchange from all parts of North America; also Dexiidæ. C. H. TYLER TOWNSEND, Las Cruces, New Mexico.

COLEOPTERA OF NORTH AMERICA AND MEXICO wanted by purchase or exchange (large collection). FRED. C. BOWDITCH, Tappan St., Brookline, Norfolk Co., Mass., U. S. A.

CYNIPIDÆ WANTED.—Named or unnamed Cynipidæ wanted by purchase or exchange. Always accompany the flies with their galls when possible. C. P. GILLETTE, Fort Collins, Colorado.

LEPIDOPTERA—Wanted to purchase good specimens of North American Lepidoptera in quantities, named or unnamed. Liberal prices paid collectors. DR. CHAS. S. MCKNIGHT, Saratoga Springs, New York.

CANADIAN HYMENOPTERA WANTED—Named or unnamed, for examination or in exchange. Correspondence desired with collectors in the Eastern and Western Provinces. W. HAGUE HARRINGTON, Post Office Department, Ottawa.

PHRYGANIDÆ WANTED.—Will exchange choice Coleoptera and Lepidoptera from Kansas, Colorado and New Mexico (Prof. F. H. Snow's collecting) for Caddis-flies, U. S. or exotic. VERNON L. KELLOGG, University of Kansas, Lawrence, Kansas





THE LATE PROFESSOR WESTWOOD.

RECEIVED

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# The Canadian Entomologist.

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## THE LATE PROFESSOR WESTWOOD.

We are much pleased to be able to give in this issue a likeness of the very eminent entomologist, Professor Westwood, for which we are indebted to the kindness of the publishers of the *Illustrated London News*.

John Obadiah Westwood, M.A., F.L.S., etc., was born at Sheffield, England, on the 22nd of December, 1805, and died shortly after completing his 87th year, on the 2nd of January last. His father was a die-sinker at Sheffield, but afterwards removed to Lichfield. When nearly 16 years of age, he went to London to be articled to a solicitor, and though he devoted his attention more to the study of natural history than of law, he was admitted as a solicitor and became partner in a firm. Having some private means, which he augmented by writing and drawing, he was enabled to neglect his profession and give himself up almost entirely to entomology and archæology.

To quote Mr. McLachlan's obituary notice in *The Entomologists' Monthly Magazine*, "it was probably by his rare, artistic talent that he acquired much of his justly great reputation. His drawings of insects were masterpieces of accuracy without the slightest attempt at effect, and rapidly executed; few have equalled him in correct delineation. There certainly never has been an entomologist who left behind him so much evidence, in practical work, of his ability to delineate insects, even to the most minute dissections. But Westwood was much more than an artist in entomology. There probably never has existed, and, in the present state of the science, there never can again exist, one who had so much general knowledge, both from personal investigation and a study of the works of others; one who was less of a specialist in the modern acceptance of the term. It is true he was a specialist, but it was in the way of taking up small groups in all orders, and working them out thoroughly, his artistic talent giving merit and force to those small monographs. Under a somewhat brusque manner was concealed a hearty sympathy for all real workers, and, if he offended, it was commonly in the way of pointing out to would-be introducers, etc., of supposed novelties that some one or other had already made similar observations, his vast mem-



ory rendering him very dangerous in this respect. In society there could be no more genial companion, full of anecdote, but with small appreciation of humour. At home there could be no more generous host."

Professor Westwood was best known on this side of the Atlantic from his admirable work—"An Introduction to the Modern Classification of Insects," which was published in two volumes in 1839 and 1840. Every entomologist, worthy of the name, has no doubt made a study of this book, which still continues to be the best text-book on the subject in the English language. His sumptuous works on exotic insects, such as his "Arcana Entomologica," "Oriental Entomology," and his edition of Drury's "Exotic Insects," are also widely known, but his numerous contributions to various Natural History periodicals, a mere list of which would fill a volume, are not so familiar to our students. He was a most industrious and prolific writer, and made investigations in almost every family of insects in all the orders. His work is always characterized by its marvellous accuracy and patient elaboration of details both of structure and habit. Very rarely was he ever known to make a mistake.

He was actively associated with the Entomological Society of London from its foundation in 1833, and was for many years its Secretary. Subsequently he was elected President at three periods of two years each, and was made Honorary Life President when the Society celebrated its jubilee in 1883. He was a Fellow of the Linnæan Society from 1827, and an Honorary or Corresponding Member of Scientific Societies all over the world.

In 1858 the Rev. F. W. Hope, a wealthy amateur, who had been for years a warm friend and patron of Westwood, and had purchased his collections, gave them and his own to the University of Oxford, and founded a Professorship of Invertebrate Zoology, which bears his name. Westwood was appointed the first Hope Professor, and, in consequence, removed to Oxford, where he was a conspicuous figure in the University for five and thirty years.

Besides his Entomological work, he was a distinguished Archæologist and was widely known amongst those of kindred tastes by his investigations of the "Palæographia Sacra Pictoria," his "Lapidarium Walliæ," and "Fac Similes of the Miniatures and Ornaments of Anglo-Saxon and Irish Manuscripts." He formed a remarkable collection of carved ivories and inscribed stones, as well as of insects. In all respects he was a remarkable man, and accomplished, by dint of steady industry and enthusiastic perseverance during a long life, an amount of valuable scientific work that has rarely, if ever, been excelled.

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## THE FIFTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

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ABSTRACTED FROM THE OFFICIAL MINUTES BY L. O. HOWARD, FOR THE  
CANADIAN ENTOMOLOGIST.

The fifth annual meeting of the Association of Economic Entomologists was held at Madison, Wisconsin, in the Science Hall of the University of Wisconsin, on August 14, 15 and 16, 1893.

Sixteen members were present, as follows:—President S. A. Forbes, Second Vice-President J. B. Smith, Secretary H. Garman, J. M. Aldrich, G. F. Atkinson, G. C. Davis, C. P. Gillette, A. D. Hopkins, L. O. Howard, M. E. Murtfeldt, H. Osborn, C. V. Riley, P. H. Rolfs, H. E. Summers, F. M. Webster and H. E. Weed. A number of visitors and members of other scientific associations were present during the sessions, making rather a large attendance.

The following papers were presented, among them several from foreign entomologists, and the discussions were of the greatest interest. I shall briefly mention the papers in the order of their presentation:—

The annual address of President S. A. Forbes reviewed the 115 economic articles containing new matter published by members of the Association since the last meeting. These articles he grouped by subjects and by nature of outcome, thus giving an admirable idea of the work of the year in shape for the drawing of conclusions. He called attention to a narrowness of view and consequent inadequacy in the treatment of general questions, due to the want of comprehensive organization and systematic co-operation. In his opinion the methods of publication and enforcement of results now in general use fall far short of their final end. As a result the farmer has not responded to the suggestions of the investigating entomologist as might be anticipated. He suggested that more attention might be paid to describing the effects of the insect work than to the insects themselves, subordinating the account of the insects. He insisted that instead of making an entomologist of the farmer we should make a farmer of the entomologist. He suggested distinguishing between the temporary and permanent presentation of facts in economic publications, advising the preparation of special economic summaries or monographs of all insect injuries to each of the various crops, and printing and distributing these summaries in great numbers. Co-operation in this particular line was urged. Addresses to Farmers' Institutes should be accompanied by a printed résumé to be distributed among those present.

He spoke of the fact that the boundaries of the States represented by official entomologists are artificial, and that in consequence matters of distribution and other broad questions are seldom touched. This fact and the danger of unnecessary duplication of work, and other reasons, called for organization, and this organization should be of flexible form, leaving each individual free to meet the special requirements of his individual work, and at the same time helping to concentrate the surplus effort which should be contributed to the accomplishment of common ends. He suggested that a committee on co-operation propose a list of subjects in which co-operative effort is desirable. These subjects should then be attacked by volunteers, who should report to the committee. In this way he thought that the benefits of organization might be obtained without the surrender of individual initiative.

The address was discussed by Messrs. Osborn, Smith and Webster. Messrs. Osborn, Smith and Garman were appointed a committee of three to consider the recommendations contained in the address.

Messrs. Edward H. Thompson, of Tasmania, R. Allan Wight, of New Zealand, and G. C. Davis, of Agricultural College, Michigan, were elected to membership.

Mr. Osborn presented a paper entitled "Methods of Treating Insects affecting Grasses and Forage Plants." In this paper he considered the insects affecting these crops by groups arranged according to the method of treatment, discussing particularly climatic conditions, natural enemies, agricultural methods and the direct method. He presented a most interesting table of insects, showing in horizontal columns the food-plants, number of annual broods, and the condition in which the species is to be found during any month in the year. The paper was discussed by Mr. Hopkins.

The next paper, by Mr. Howard, was entitled "Notes on Methods of studying Life-histories of Injurious Insects," in which he described the vivarium methods in use in the Division of Entomology of the U. S. Department of Agriculture, but insisted that outdoor work is preferable where feasible. The question of methods of ventilation of the insectary and kindred topics were discussed by Messrs. Forbes, Garman and Howard. Mr. Forbes thought that indoor work on life-histories should always be verified by outdoor observation.

Under the caption "Another Mosquito Experiment," Mr. Howard detailed his experience with the use of kerosene on the surface of mosquito

breeding pools since his announcement of his first experiment a year ago. Mr. Smith in discussion mentioned two cases where this remedy had been applied effectually on Long Island. Mr. Webster thought that further experimentation was needed on the line as to the office of mosquito larvæ in destroying organic matter in water, which might otherwise become offensive.

The Secretary read a paper by Dr. Ritsema Bos, on "*Phytomyza affinis*, Fall., as a Cause of Decay in Clematis." The larvæ of this little fly he had found to produce a disease spot on the stem a little above the level of the ground, causing the subsequent drying up of the stem. He found two generations of the fly each year, and advised the cutting off and burning of decaying stalks in early summer. Messrs. Hopkins and Garman reported similar appearances in potato stalks and the terminal twigs of apple, which were probably due to a closely allied insect.

Mr. Smith read a paper on "Farm Practice and Fertilizers as Insecticides." The nature of the paper is well indicated by its title. A number of instances were pointed out where variation in farm practice produces excellent insecticide results, and others in which commercial or artificial fertilizers destroy subterranean insects as well as invigorate the crop. The intelligent use of fertilizers combined with other intelligent farm practice, in his opinion will in the future prove the main reliance of the farmer. He showed, however, that the phosphates form a group of fertilizers which have no insecticide value.

Messrs. Garman and Webster discussed this paper, and agreed that the main beneficial results in the use of artificial fertilizers are due to the increased vigour of the plant, enabling it to better resist the attacks of insects. They doubted the primary insecticide effect of these compounds.

The above papers were all read at the first session of the Association, on the afternoon of August 14. At the second session, on the morning of the 15th, letters were read from certain foreign entomologists regretting their inability to attend the meeting.

Mr. Garman presented a paper on the "Preservation of Larvæ for Study." He drops the larva into water heated to the boiling point, leaving it for 15 seconds. Then, when the body wall is somewhat rigid, he takes it up with the forceps, and with a fine sharp scissors cuts a slit along the underside of the body, dropping it into the water again for a few seconds longer. It is then transferred to 50% alcohol, and in 12 hours to 70%, and in 12 hours afterwards to 95%, for permanent preservation.

Shape, colours and structure are well preserved in this way. As a substitute for alcohol he recommends :—boiling water, 250 cc., ; common salt, 3 teaspoonfuls ; powdered alum, one teaspoonful ; pure carbolic acid, 5 drops ; filter.

Mr. Forbes spoke of the preservation of fruits at the World's Fair, and suggested that plants injured by insects may be preserved in the same way. Mr. Summers had found nothing which would satisfactorily preserve fruits. Mr. Osborn thought that aqueous preparations would freeze. Mr. Smith has employed with success methods similar to those of Mr. Garman.

A paper by Mr. Cockerell, entitled "The Distribution of Coccidæ," was read by the Secretary. He compared the Coccidæ of the West India Islands with the adjoining mainland, and spoke of the further distribution of a number of species which he had studied in Jamaica. Of 18 species found on that Island all but 3 are known elsewhere, and 11 have been detected outside of neotropical regions.

Mr. Hopkins presented his views on "Note and Record-keeping for the Economic Entomologist." He described the system which he has worked out and adopted, and which he has proved to be well adapted to the requirements of his work. The system consists of an accession catalogue and a species catalogue. Specimens of his cards or note pads were exhibited, and Messrs. Smith, Osborn and Webster discussed the paper, Mr. Webster giving in full his own system of note-keeping. Messrs. Smith and Osborn objected to the use of check-list numbers alone for species as adopted by Mr. Hopkins.

Mr. Garman's paper on "Illustrations for the Economic Entomologist" was next presented. He considers that the object of illustrations is to convey information and to save time in description, finish and technique, being, therefore, matters of secondary importance. The different methods of reproducing drawings was very carefully and fully discussed. Etching was considered in general impracticable, as calling for a special method of drawing. Lithography was considered too expensive, and wood engraving is subject to liability of the engraver to misinterpret certain details of the drawing ; but at the same time it was admitted that of our published figures wood-cuts are the best. In spite of its disadvantages, it is the most satisfactory method, although somewhat expensive. Cheap process figures are excellent for newspaper and other transient literature. Their right in permanent literature, and especially in scientific

writings, is questionable at the present time. No cheap process known to the writer gives good results in shaded figures. These figures give promise of something better in the near future. If it were not, however, for this hopeful outlook, it would be well to return to wood-engraving. Entomologists were urged to make their drawings with extreme care and to adapt them to a particular process, and not to rest satisfied with inferior reproduction. The paper was discussed by Messrs. Osborn, Weed, Smith, Hopkins, Gillette, Forbes and Howard.

Mr. Gillette read a paper on "The Arsenites and Arsenical Mixtures as Insecticides." The article comprised a general summary, historical and critical, of the use of these substances in their different combinations. The paper was discussed briefly by Messrs. Beal, Wood and Galloway, all of whom were present at the meeting, although not members of the Association.

Upon invitation, Mr. B. T. Galloway, Chief of the Division of Vegetable Pathology of the U. S. Department of Agriculture, gave a short account of some recent work done in his division upon a bacterial disease of melons and other cucurbits, which had been found to be largely disseminated by the agency of insects, particularly of *Diabrotica vittata* and *D. 12-punctata*. Messrs. Webster, Smith and Garman had seen the same disease in their respective localities.

At the third session, held in the afternoon of August 15, an amendment to the constitution was adopted levying annual dues of fifty cents upon each member of the Association, and a resolution was passed authorizing the publication of the whole proceedings in *Insect Life*, and the sending of an abstract to the CANADIAN ENTOMOLOGIST.

Messrs. Osborn, Webster and Weed were appointed a committee on nomination of officers.

Mr. Hopkins read a paper on "Destructive Scolytidæ and Their Imported Enemy." He gave a summary of the damage done by bark-boring beetles in West Virginia and other portions of the country, and his investigation of this damage in the former State. He further described his trip to Germany during 1892, and the collection of about 1,000 specimens of *Clerus formicarius*, which he brought alive to this country. He described the placing of the insects and their over-wintering. Up to the time of presentation of the paper no means of ascertaining to what extent the insects have multiplied had been found.

Mr. Riley presented a communication entitled "Parasitic and Predaceous Insects in Applied Entomology." He indicated the utility and importance of the subject, and pointed out the dangers and disadvantages resulting from false and exaggerated opinions. He gave an extended summary of the methods in which insect enemies of insects may be utilized; and followed with a chronological and detailed account of the suggestions and attempts, successful and otherwise, to introduce parasites and predaceous insects into one portion of a country from another, or into one country from another. He showed that the general laws governing the interactions of organisms, however, are such that we can in only very exceptional cases derive benefit by interference with them. The indigenous enemies of an indigenous insect are better qualified to keep it in check than an imported species. Where the injurious insect is a foreigner, however, and has been brought over without the enemy which keeps it in check in its native home, then the introduction of these enemies will be advisable. Thus the introduction of the European parasites of the Gypsy Moth would be advisable. Such an introduction could do no possible harm, and may be productive of lasting good.

Mr. Smith followed with a paper in the same line, called "The Economic Value of Parasites and Predaceous Insects." The writer, while realizing the importance of parasites in maintaining the balance of nature, felt that their economic value has been grossly over-estimated. He showed that parasites simply reduce excess, but only after damage to crops has been done. The practical utilization of parasites is more or less a myth, except in very exceptional cases like that of *Vedalia* and *Icerya*. An injurious insect which under natural conditions is abundant each year, must be dealt with without regard to parasites or natural enemies.

Mr. Webster read a paper on "Insect Foes of American Cereal Grains, with Measures for Their Prevention or Destruction." In the main the author insisted upon the importance of proper farm practice. He knows of no better insecticide than good farming. Four-fifths of the injury done by the Hessian Fly may be prevented by a better system of agriculture. The same point was elaborated with regard to other grain insects, and the serious ravages of a number of the most important pests were pointed out, and general consideration of the proposed direct remedies was entered into. In the opinion of Mr. Webster, the field of the economic entomologist is poorly defined at present,

and too much is expected from him. The science of applied agriculture should relieve him of some of his duties. This paper was discussed in some of its details by Messrs. Riley, Forbes and Howard.

The fourth session was held on the morning of August 16. The Committee on the President's Address reported in favor of the adoption of his recommendations and the appointment of a standing committee to present a detailed plan for co-operative work among members, and to make recommendations concerning legislation. The report was adopted, and Messrs. Osborn, Smith and Garman were appointed as a committee.

Mr. Forbes read a paper by H. Du Buysson upon "Fumigation with Carbon Bisulphide for the complete and rapid destruction of Insects which attack Herbaria, Furrieries and Woollen Stuffs." In this article a very ingenious and interesting water joint for the box used for fumigating purposes was described, and the best method of employing the box for the different classes of objects mentioned in the title was given. Mr. Atkinson stated in discussion that he had used a very similar box in fumigating objects infested by insects. Mr. Garman stated that at Cambridge a zinc-lined case was constantly used for disinfecting bird and mammal skins. Mr. Riley had used the bisulphide in the insect collections of the National Museum. Mr. Smith had used it against ants and Mr. Garman against the melon louse. The latter gentleman rolls the melon vines up into a heap, inverts a tub over them, and places a little bisulphide in a saucer under the edge of the tub.

Mr. Atkinson read a paper by Dr. J. Ritsema Bos, on "*Aphelenchus olesistus*, nov. sp., a nematoid worm, causing Leaf-sickness in Begonia and Asplenium." He referred to a note by Mr. Atkinson, read at the preceding meeting of the Association, in which an Anguillulid is described as affecting leaves of Chrysanthemum and Coleus, making no swelling or deformity, but causing brown patches on the leaves. The author having studied and described *Aphelenchus olesistus* in Europe, where it causes almost precisely the same trouble with Begonia and Asplenium, he is inclined to think that the species previously mentioned by Mr. Atkinson is identical. In the discussion, Mr. Atkinson stated that while there were characters in the form studied by him which seemed to place it in the genus *Tylenchus*, he thought that careful comparison of types might show the two to be identical.

Mr. Osborn presented a paper on "Methods of Attacking Parasites of Domestic Animals." The preventive measures consisted in the ex-



amination of the introduced animals and the application of the usual direct methods. A critical summary of all the proposed remedies followed. The paper was briefly discussed by Messrs. Gillette, Aldrich, Riley, Hopkins, Weed and Howard. Mr. Riley, in speaking of the alleged poor success on the part of certain individuals in the use of kerosene emulsion, said that the difficulties of making a good emulsion and of getting intelligent farmers to use it safely are unnecessarily magnified. He further stated that he could not accept the opinion that in the case of two given remedies the poorer one was to be recommended, because the better one required a little more care and intelligence in making and using.

In the paper by Mr. Weed on "Remedies for Insects Injurious to Cotton," the author discussed the application of Paris green against the Cotton Worm by means of bags at the extremities of a long pole, carried by a "darkey" on a mule, going at a brisk trot between the rows. This he considered to be the most simple apparatus which he had seen for distributing dry poisons. For the Boll Worm, he considered the best application to be the planting of a row of corn about every tenth row through the cotton field at such a time that it will mature early in September.

In Miss Murtfeldt's paper on "The Cheese or Meat Skipper," which followed, the author drew an interesting parallel between the tendency of the farmer to exaggerate his losses from insect damage and that of the commercial man to underestimate this damage and to conceal it because of its possible influence upon his trade. She reviewed the literature of *Piophilæ casei*, and said that accounts of its life-history are not readily accessible in this country. She gave a popular synopsis of her personal observations upon the species, particularly as injuring hams. The larvæ feed principally around the bony ends among the tendons, and in the fat and in the oil-saturated folds of the canvas wrappers. Hibernation is in the adult stage. About thirty eggs are laid by each female. The larval stage lasts from seven to eight days, and the puparium state about ten days. There is no definite succession of broods, and the insect may be found in all stages from May until November. The flies are readily killed by the fumes of burning sulphur or pyrethrum powder. The covering of windows with a light domestic is advised, as the flies will get through ordinary wire screens. The paper was briefly discussed by Messrs. Aldrich and Riley.

Mr. Coquillett's paper, entitled "Hydrocyanic Acid Gas as an Insecticide," was read by the Secretary. The paper consisted of an historical review of the use of this gas in California, together with an account of the methods in use at the present time, and some slight consideration of its effect upon different insects. The cost of fumigating a tree varies from five cents to one dollar, and even at the latter rate figures were produced to show that it is economical.

A paper by Dr. J. A. Lintner, on "Arsenical Spraying of Fruit Trees while in Blossom," was read by Mr. Smith. The author reviewed the experiments by Mr. Webster, and the statements by Mr. Cook, and suggested that the whole question can be settled by confining a hive of healthy bees to blossoms sprayed with Paris green, and afterward testing the stomach for arsenic. The law against spraying while trees are in blossom, as passed by the Legislature of Ontario, was reviewed, and a long list of the insects which might be satisfactorily treated by arsenical spraying at the time of blossoming was given. Further experimentation was strenuously urged. Some discussion followed by Messrs. Webster and Garman.

The fifth session was held in the afternoon of the 16th August. The following officers for the ensuing year were elected:—

President, L. O. Howard.

First Vice-President, J. B. Smith.

Second Vice-President, F. L. Harvey.

Secretary, C. P. Gillette.

Three papers on the insects of the season in their respective localities were read by Messrs. Webster, Smith and Osborn, and were discussed by Mr. Riley.

A paper by Mr. R. Allan Wight, of Auckland, New Zealand, was read by Mr. Osborn; it was entitled "*Icerya purchasi* and *Vedalia cardinalis* in New Zealand." The paper consisted of a condensed summary of the history of these two insects in New Zealand and their inter-relations. This paper was discussed by Mr. Riley.

Mr. Smith then read a paper by Mr. F. W. Urich, of Port of Spain, Trinidad, consisting of "Notes on Some Insect Pests of Trinidad, B. W. I." The paper was an interesting summary of Mr. Urich's observations on the injurious insects of that Island, and referred mainly to Coccidæ and their natural enemies, a leaf-cutting ant (*Atta sexdens*), a longicorn beetle (*Steirastoma depressum*) and certain Acridiidae. Especial mention of a little Cyprinodont fish was made. This fish is found commonly all through Trinidad, and feeds upon mosquito larvæ. Mr. Urich suggested its introduction into America for use in tanks and ponds.

The Secretary then read a "Note on Slip-records," by Mr. Cockerell. The author suggested the use of a uniform system of notes upon slips of a uniform size by all entomologists, and submitted samples. The question was discussed by Messrs. Hopkins, Summers and Riley.

The Association then adjourned subject to the call of the Executive Committee.

## LIST OF COLEOPTERA TAKEN AT SPARROW LAKE, ONT.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Sparrow Lake is an expansion of the Severn river, situate a little south of lat.  $45^{\circ}$  and east of  $80^{\circ}$  longitude. Geologically, this part of Ontario belongs to the Laurentian formation, and that of a very rugged type. The southwest side of the lake, where these coleoptera were taken, save in a few spots among the rocks, is wholly uncultivated and uncultivable to the Georgian Bay, a distance of from 20 to 30 miles. Till recently it sustained an immense forest growth, mostly pine, which has now disappeared, and has been succeeded by a dense and almost impenetrable jungle of briars and bushes of many deciduous species.

So far as coleoptera are concerned, a large majority of the species inhabiting this district must be considered autochthonous, and it is not difficult to determine approximatively such as are following the little spots of cultivation that are being interjected. The collecting was done from July 20th to August 15th. That the list is no longer is not altogether the fault of the collector; in fact, in addition to the paucity of species, while some are in great abundance, the majority are each represented by from one to three examples only.

As this part of Ontario is in a comparatively primitive condition, and no record of the coleoptera inhabiting it has been observed, the subjoined list may be of some interest:—

*Cicindela repanda*, Dej.  
     var. *12-guttata*, Dej.  
*Cychrus Lecontei*, Dej.  
*Carabus sylvosus*, Say.  
*Calosoma scrutator*, Fab.  
     *Wilcoxi*, Lec.  
     *calidum*, Fab.  
*Elaphrus ruscarius*, Say.  
*Loricera cærulescens*, Linn.  
*Nebria pallipes*, Say.  
*Scarites subterraneus*, Fab.  
*Dyschirius nigripes*, Lec.  
*Bembidium patrule*, Dej.  
     *versicolor*, Lec.  
     Sp. undetermined.

*Pterostichus corvinus*, Dej.  
     *erythropus*, Dej.  
*Amara exarata*, Dej.  
     *pallipes*, Kirby.  
     *rubrica*, Hald.  
*Calathus gregarius*, Say.  
*Platynus sinuatus*, Dej.  
     *extensicollis*, Say.  
     *atratus*, Lec.  
     *melanarius*, Dej.  
     *corvus*, Lec.  
     *placidus*, Say.  
     *Bogemanni*, Gyll.  
     *ruficornis*, Lec.  
*Galerita janus*, Fab.

- Tachys nanus*, *Gyll.*  
*flavicauda*, *Say.*  
*Patrobus longicornis*, *Say.*  
*Pterostichus honestus*, *Say.*  
*coracinus*, *Newm.*  
*stygius*, *Say.*  
*lucublandus*, *Say.*  
*caudicalis*, *Say.*  
*luctuosus*, *Dej.*  
*Agonoderus pallipes*, *Fab.*  
*Harpalus erraticus*, *Say.*  
*viridiæneus*, *Beauv.*  
*Sp. undetermined.*  
*pennsylvanicus*, *De G.*  
*fallax*, *Lec.*  
*pleuriticus*, *Kirby.*  
*viduus*, *Lec.*  
*Stenolophus plebeius*, *Dej.*  
*conjunctus*, *Say.*  
*Anisodactylus Harrisii*, *Lec.*  
*interstitialis*, *Say.*  
*Ilybius biguttatus*, *Germ.*  
*Hydaticus stagnalis*, *Fab.*  
*Dytiscus fasciventris*, *Say.*  
*Gyrinus canadensis*, *Reg. ?*  
*anal*, *Say.*  
*Berosus striatus*, *Say.*  
*Philydrus perplexus*, *Lec.*  
*Hydrobius fuscipes*, *Linn.*  
*Creniphilus sub-cupreus*, *Say.*  
*Cercyon pygmæum*, *Ill.*  
*Necrophorus vespilloides*, *Hbst.*  
*Silpha Americana*, *Linn.*  
*Pæderus littorarius*, *Grav.*  
*Sunius longiusculus*, *Mann.*  
*Tachinus repandus*, *Horn.*  
*fimbriatus*, *Grav.*  
*Erchomus ventriculus*, *Say.*
- Lebia viridis*, *Say.*  
*Metabletus americanus*, *Dej.*  
*Cymindis pilosa*, *Say.*  
*Brachynus cyanipennis*, *Say.*  
*Chlænius sericeus*, *Forst.*  
*pennsylvanicus*, *Say.*  
*Anomoglossus emarginatus*, *Say.*  
*Brachylobus lithophilus*, *Say.*  
*Liodes discolor*, *Mels.*  
*Homalota trimaculata*, *Er.*  
*Bolitochara picta*, *Fauv.*  
*Aleochara bimaculata*, *Grav.*  
*graciliformis*, *Fauv.*  
*Gyrophæna vinula*, *Er.*  
*Quedius fulgidus*, *Fab.*  
*lævigatus*, *Gyll.*  
*Listrotrochus cingulatus*, *Grav.*  
*Creophilus maxillosus*, *Linn.*  
*Staphylinus violaceus*, *Grav.*  
*Philonthus pclitus*, *Linn.*  
*longicornis*, *Steph.*  
*micans*, *Grav.*  
*cyanipennis*, *Fab.*  
*sordidus*, *Grav.*  
*Sp. undetermined.*  
*Xantholinus obsidianus*, *Mels.*  
*emmesus*, *Grav.*  
*obscurus*, *Er.*  
*N. S. (found here).*  
*Baptolinus longiceps*, *Fauv.*  
*Stenus*—3 sp.  
*Lathrobium punctulatum*, *Lec.*  
*bicolor*, *Lec.*  
*Stilicus*, sp.  
*Histerdepurator*, *Say.*  
*sedecimstriatus*, *Say.*  
*carolinus*, *Payk.*  
*Lecontei*, *Mars.*

- Conosoma pubescens*, Payk.  
*Boletobius cincticollis*, Say.  
*Olisthærus substriatus*, Gyll.  
*Oxyporus femoralis*, Grav.  
     *rufipennis*, Lec.  
*Oxytelus sculptus*, Grav.  
     *pennsylvanicus*, Er.  
     *insignitus*, Grav.  
*Trogophlæus 4-punctatus*, Say.  
*Scaphisoma convexum*, Say.  
*Hippodamia 13-punctata*, Linn.  
*Coccinella trifasciata*, Linn.  
*Chilocorus bivulnerus*, Muls.  
*Psyllobora 20-maculata*, Say.  
*Hyperaspis signata*, Oliv.  
*Scymnus lacustris*, Lec.  
*Endomychus biguttatus*, Say.  
*Tritoma thoracica*, Say.  
*Silvanus bidentatus*, Fab.  
*Læmophlæus fasciatus*, Mels.  
*Calopteron terminale*, Say.  
*Calochromus perfaceta*, Say.  
*Ellychnia corusca*, Linn.  
*Telephorus lineola*, Fab.  
     *scitulus*, Say.  
*Collops tricolor*, Say.  
*Trichodes Nuttalli*, Kirby.  
*Hydnocera pallipennis*, Say.  
     *longicollis*, Zieg.  
*Cis fuscipes*, Mellie.  
*Canthon lævis*, Drury.  
*Onthophagus Hecate*, Panz.  
*Dialytes striatulus*, Say.  
     *Ulkei*, Horn.  
*Aphodius fossor*, Linn.  
     *fimetarius*, Linn.  
     *ruricola*, Mels.  
     *leopardus*, Horn.
- Epuræa Erichsonii*, Reit.  
     Sp.  
*Ips fasciatus*, Oliv.  
*Stephostethus liratus*, Lec.  
*Corticaria pusilla*, Mann.  
     *pumila*, Lec.  
*Tenebrioides corticalis*, Mels.  
*Cyphon obscurus*, Guer.  
*Deltometopus amœnicornis*, Say.  
*Dromaeolus Harringtoni*, Horn.  
*Alaus myops*, Fab.  
*Agriotes fucosus*, Lec.  
     Sp.  
*Melanotus castanipes*, Payk.  
     *fissilis*, Say.  
*Corymbites medianus*, Germ.  
     *propola*, Lec.  
*Dicerca tuberculata*, Chev.  
     Sp. undetermined.  
*Buprestis rusticorum*, Kirby.  
     *fasciata*, Fab.  
*Agrilus ruficollis*, Fab.  
*Valgus canaliculatus*, Fab.  
*Hylotrupes bajulus*, Linn.  
     *ligneus*, Fab.  
*Calloides nobilis*, Say.  
*Arhopalus fulminans*, Fab.  
*Xylotrechus sagittatus*, Germ.  
*Clytanthus ruricola*, Oliv.  
*Euderces picipes*, Fab.  
*Desmocerus palliatus*, Forst.  
*Centrodera decolorata*, Harr.  
*Gaurotres cyanipennis*, Say.  
*Typocerus sparsus*, Lec.  
     *velutinus*, Oliv.  
*Leptura nitens*, Forst.  
     *canadensis*, Oliv.  
     *vagans* (var. *brevis*, Kirby)

- Aphodius lentus*, *Horn.*  
*Geotrupes splendidus*, *Fab.*  
*Anomala lucicola*, *Fab.*  
*Ligyris relictus*, *Say.*  
*Euphoria fulgida*, *Fab.*  
*Osmoderma scabra*, *Beauv.*  
*Trichius affinis*, *Gory.*  
*Pachybrachys femoratus*, *Oliv.*  
     *hepaticus*, *Mels.*  
*Monachus saponatus*, *Fab.*  
*Diachus auratus*, *Fab.*  
*Adoxus obscurus* (var. *vitis*, *Fab.*)  
*Xanthonia 10-notata*, *Say.*  
*Typophorus canellus* (var. *aterri-*  
     *mus.*)  
*Chrysochus auratus*, *Fab.*  
*Rhabdopterus picipes*, *Oliv.*  
*Doryphora 10 lineata*, *Say.*  
*Chrysomela bigsbyana*, *Kirby.*  
*Galerucella nymphææ*, *Linn.*  
*Diabrotica 12-punctata*, *Fab.*  
     " *vittata*, *Fab.*  
*Phyllobrotica decorata*, *Say.*  
*Cerotoma 3-furcata*, *Forst.*  
*Dysonychia pennsylvanica*, *Illig.*  
*Haltica ignita*, *Illig.*  
*Crepidodera helxines*, *Linn.*  
*Epitrix cucumeris*, *Harris.*  
*Systema hudsonias*, *Forst.*  
     *marginalis*, *Illig.*  
*Nyctobates pennsylvanica*, *De G.*  
*Xylopinus saperdioides*, *Oliv.*
- Monohammus confusor*, *Kirby.*  
*Urographis fasciatus*, *De G.*  
*Saperda vestita*, *Say.*  
     *3-dentata*, *Oliv.*  
*Amphionycha flammata*, *Newm.*  
*Donacia palmata*, *Oliv.*  
     *piscatrix*, *Lac.*  
     *proxima*, *Kirby.*  
     *2 sp. not determined.*  
*\* Tenebrio molitor*, *Linn.*  
*Blapstinus interruptus*, *Say.*  
*Uloma impressa*, *Mels.*  
*Diaperis hydni*, *Fab.*  
*Boletotherus bifurcus*, *Fab.*  
*Cistela sericea*, *Say.*  
*Penthe pimelia*, *Fab.*  
*Eustrophus confinis*, *Lec.*  
*Canifa pallipes*, *Mels.*  
*Stenotrachelus arctatus*, *Say.*  
*Anaspis rufa*, *Say.*  
*Mordella melæna*, *Germ.*  
     *marginata*, *Mels.*  
*Xylophilus tuberculifer*, (*infra.*)  
*Epicauta pennsylvanica*, *De G.*  
*Attelabus bipustulatus*, *Fab.*  
*Ithycerus noveboracensis*, *Forst.*  
*Lissorhoptus simplex*, *Say.*  
*Magdalis armicollis*, *Say.*  
*Orchestes niger*, *Horn.*  
*Gymnetron tetrum*, *Fab.*  
*Balaninus uniformis*, *Lec.*  
*Eupsalis minuta*, *Drury.*  
*Dryocetes*, *n. sp.*

*Loricera cærulescens*, *Linn. (pilicornis, Fab.)*. A few examples of this interesting beetle were taken on the margin of the lake under pieces of drift partly immersed in the water. It seemingly avoids muddy places.

*Chlœnius pennsylvanicus*, *Say.* A variety, or rather individuals of this species, occurred with the margins of the elytra bordered with rufous like

in *circumcinctus*, but which lack the smooth facets of the thorax of that species. This is the *circumcinctus* seen in some Canadian lists, but the true *circumcinctus* does not inhabit Canada.

*Aleochara graciliformis*, *Fauv.* This species, though named many years ago by Mr. A. Fauvel (as I am informed), has never found a place in our catalogue. It has been in my collection from various places in Ontario for several years. It is a very pretty species, black, thorax without impression, legs and elytra bright rufous; an occasional individual has the sides of the elytra narrowly black, and while such are more finely punctate and have darker legs they are not considered distinct.

*Philonthus politus*, *Linn.* (*aeneus* Rossi). This species was correctly determined by both Kirby and Macklin. It is nearly cosmopolite. The *politus* of our catalogue must be changed to *fuscipennis*, *Mann.* These are the latest decrees of synonymists.

*Creophilus maxillosus*, *Linn.* Systematists now recognize but one species of *creophilus* as inhabiting North and South America, Asia, Northern Africa and Europe. It exists in about ten named varieties or variations, *villosus*, *Grav.*, and *bicinctus*, *Mann.*, being the American forms.

*Bolitochara picta*, *Fauv.* This species was as abundant as in Pennsylvania, being gregarious on mushrooms. My types of this species are from Mr. F. Blanchard, for whom it was determined by Mr. A. Fauvel. It has the habit of a *Gyrophæna*. The antennæ, head, thorax, and last segments of the abdomen are dark; the legs, 3 to 4 segments of the abdomen, and pro and mesothorax are pale; the elytra are pale, with an ill-defined triangular space posteriorly and sometimes a spot around the scutellum dusky. There is at the middle of the base of the thorax a circular depression marked anteriorly with two comma-like impressions. Length, .10 inch.

*Baptolinus? longiceps*, *Fauv.* As Mr. A. Fauvel has stated that he had seen examples of *longiceps* from Canada, special search was made for that species, resulting in the taking of four examples, which, while not agreeing with Mr. Fauvel's characters of *longiceps* in every respect as given in his synopsis ("Tête alongée, non transverse, un peu plus étroite que le corselet; corps brun; élytres ponctuées"), probably do not vary beyond specific limits; the elytra are rather alutaceous than punctured; the form of the head—"long or transverse"—is opinionative; the colour of the elytra, thorax and head, piceous. One example taken here and two others at Ligonier, in the Alleghanies, are in every way identical

Mr. A. D. Hopkins, Entomologist of the West Virginia Agricultural Experiment Station, to whom one of the Canadian examples was submitted for comparison, kindly states that there is "little perceptible difference" between it and that named *longiceps* for him by Dr. Riley through the National Museum. In the seven examples seen no sexual differences are observable in the head or abdomen. I have examples of a species occurring in the White Mountains of New Hampshire, which is quite different, having a very large head, especially the ♂. It has received the name *macrocephalus*, Nord, but from which it differs by not having the 6th ventral segment of the ♂ emarginate and the thorax tripunctate (Mannerheim's description). I have two female examples from Alaska—one from Wrangel with the thorax tripunctate (*macrocephalus*) agreeing in every other essential point with the New Hampshire females; and one from Prince of Wales Island, with the thorax bipunctate, entirely pallid, and .15 inch long, but otherwise agreeing with the Wrangel example; more material, however, must be seen before their identity can be assured. Thus it appears there are at least three distinct species of *Baptolinus* inhabiting North America, whatever may be said of names. This is the species mentioned as *pilicornis* in CAN. ENT., XXIV., 293, but more material shows that the head is smaller than in that species, the description of which otherwise is fairly applicable; and it is in many ways different from the New Hampshire species. In the article referred to, read (Rev. Entomol., VIII, 117), *B. longiceps*, Fauv., instead of as in lines 28-29. Mr. F. Blanchard mentions (*in litt*) an example with the head scarcely punctured, taken by him in North Carolina, which probably belongs here.

*Dicerca*, sp. Two examples, ♂ and ♀, were taken in the lake, which seem to be nondescript; in size and sculpture they resemble *Chrysea*, *Mels.*, to which they were about to be referred till the terminal ventral segment of the ♀ was observed to be rounded; the same segment of the ♂ is truncate and rectangularly emarginate, and the middle tibia toothed. Other examples were subsequently seen in another collection, and it is possibly confused in northern cabinets with *chrysea*, from which it seems best separated by the sexual characters of the female.

*Aphodius leopardus*, *Horn.* This species occurred in some abundance, as it likewise did at Parry Sound on the Georgian Bay, and at intermediate points. It was not taken with the other species about cow-yards, but on paths through the forest. Before the introduction of domestic



cattle it probably lived in the ejectamenta of deer, moose and other wild animals ; only one example of *lentus* was taken, and that in the forest ; *fossor* was common, and whether it was originally introduced into America from Europe is not free from doubt—it seems to inhabit the colder and mountainous regions, and in Pennsylvania is not uncommon in the Alleghanies. *Ruricola* and *fmelarius* were excessively abundant everywhere, and seem to follow cultivation. *Inquinatus* has not as yet appeared in this district.

*Dialytes Ulkei*, *Horn*. Two examples were taken at Sparrow Lake and another at Rosseau, about 50 miles northward. The type of the species was taken at Deer Park, Maryland, and it is not known to me whether it has ever been duplicated.

*Leptura Canadensis*, *Oliv*. Occurred in some abundance ; it breeds in the bark of dead pine trees like *Urographus fasciatus* does in that of oak, without entering the wood. All the females seen had the base of the elytra red ; there is no uniformity in the coloration of the outer joints of the antennæ of the ♀ ; the 3rd joint is usually black, with sometimes a pale spot at base ; the 4th is commonly pale at base for half its length, sometimes the lower side is pale for its whole length and the upper black, or again there is merely a pale spot at base ; the 5th is mostly half black, but sometimes with only a pale basal spot ; the 6th may be altogether pale, or with the apex black, or with it spotted on one side or on both ; the 7th is altogether black, but exceptionally with a pale basal spot ; the 8th is altogether pale, with the apex sometimes black ; the 9th is as the 7th ; the 10th is usually pale at base, but sometimes altogether black. The antennæ of the ♂ are black, but in some examples there is a pale spot at the base of joints 6 and 8. These particulars have been entered into to show that antennal colour variation cannot be used to separate into species the variable forms now included in *Canadensis*.

*Leptura vagans*, *Oliv*. (var. *brevis*, Kirby). This variety should be placed in our catalogue, inasmuch as it exists locally of a fairly constant type ; that is, with dark elytra with a sulphur-yellow discal vitta on each ; this was absent in one example, which was entirely black. The *vagans* form has usually yellow elytra, some examples being marked with brown indefinitely. Without notice it requires some research to discover that *brevis* is *vagans*.

*Adoxus obscurus*, *Linn*. (var. *vitis*, Fab). This was beaten in great abundance mostly from willow, though that this is its only food-plant is

not affirmed. The variety *vitis* is light brown, very constant in colour, and so far the only form occurring in Canada. The variety *obscurus* is taken abundantly in places throughout the Rocky Mountains to Arizona and New Mexico; typically it is black, but many of the examples are rufous, and in some of these the rows of punctures on the elytra are black, causing a vittate appearance. This rufous form is readily distinguished from *vitis* by the greater intensity of the colour and the much coarser punctostriation of the elytra. These two forms likewise occur in Northern Asia and Europe, as well as three other named varieties.

*Dysonycha pennsylvanica*, *Illig.* (var. *limbicollis*, Lec.) was taken in great numbers from *Polygonum hydropiper*, which it had nearly defoliated.

*Systema marginalis*, *Illig.*, was beaten in great abundance from the dwarf oaks growing among the highest elevated rocks.

*Xilophilus*, n. s. About a dozen examples of this were taken at one time by bush-beating, but owing to their minuteness only two were found in the bottle, which contained many other insects. It is about half the size of *piceus*, which it resembles in colour, and in having a transverse basal impression on the thorax, though deeper; the elytra are deeply circularly impressed at base, giving rise to two tubercles well separated by the suture; the punctuation of the head and thorax is fine and dense, that of the elytra coarser; between each facet of the eye may be seen a clavate bristle, not extending beyond the facet. The first three joints of the antennæ and the tarsi are pale. The insect is piceous-black, finely cinereo-pubescent, .045 to .05 inch long, and may be called *tuberculifer*, to preserve it from the oblivion often incidental to such small things.

? *Dryocætes*, *Sp.* This is probably the species cited in Packard's Forest Insects, p. 810, (5th Rep. U. S. Commission), as *Dryocates*, ? *affaber*, found by Mr. W. Hague Harrington in the cones of *Pinus resinosa*. This insect by difference of antennal club and tibial form does not appear to be a true *Dryocætes*; neither by colour nor elytral striation and punctuation does it conform to Mannerheim's description of *affaber*. Examples were sent to Prof. A. D. Hopkins, of the West Virginia Experiment Station, for comparison with *affaber* as determined by Mr. Eichoff, who writes, "I have compared it with my examples of *Dryocates*, and find it quite a different thing from any of them; in fact, it differs so widely that I would pronounce it a new species. \* \* In the club of the antenna and tibia it differs from the other species so much that we might say it belonged to another genus." This species breeds in the cones of *Pinus strobus*, which grow to the length of 6 or 7 inches; the eggs are probably deposited in the young cones early in the season, the vitality of which becomes so much impaired by the larvæ that they drop to the ground when 3 or 4 inches long. Several of these collected the last week in July contained larvæ apparently full grown. Cones opened Sept. 10th contained the perfectly chitinized and maturely coloured beetles—20 or more in each. Therefore the pupa state must have been brief.

## NEW NORTH AMERICAN HOMOPTERA.—NO. VI.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

I. AMALOPOTA FITCHI, *n. sp.*

Closely allied to *A. Uhleri*. Smaller; elytra smoky, about twice banded with white; nervures carmine, ocelli apparently wanting. Length, 6 mm.

Male: Vertex shorter and broader posteriorly than in *Uhleri*, hind margin very feebly emarginate, apex of the pronotum not advanced beyond the base of the lateral keels; frontal keel, viewed from the side, broader and more strongly rounded, with a more conspicuous notch at the base of the clypeus than in *Uhleri*. Antennæ ligulate, slightly narrowed at base, the sides thickened and parallel beyond, setigerous notch deeper than in *Uhleri*. Eyes very feebly emarginate below. Pronotum, viewed from above, less acutely angled before and exhibiting a slightly thicker edge than in *Uhleri*, the expanded sides subquadrate with rounded angles. Rostrum only attaining the apex of the hind coxæ. Elytra similar in form to those of *Uhleri*, the neuriation nearly the same but with fewer apical areoles, these being ten in number from the tip of the clavus to the apex of the subcostal nervure; subapical areoles six, of which the first (outer) is large and oblong, the second small and triangular, and the third the longest; basal nervures four, long.

Colour pale yellowish-white, more obscure on the mesonotum and abdomen; sides of the face with a transverse carmine band between the base of the antennæ and the eye which is extended along the sides of the thorax where it becomes darker; abdomen sanguineous above, the genital segments brown. Eyes and tip of the rostrum black; antennæ reddish-brown, the thickened edges darker. Elytra blackish-fuscos; a basal elongated yellowish spot on the costa including the rounded elytral appendage; beyond this are two rounded dots, a broad transverse median band not touching the costa, and a large angular spot on the third and fourth subapical areoles sending a branch to the apex of the costa and another to the middle of the apical margin, whitish-hyaline; narrow costal area white with four brown spots, the stigmal deeper and crossed at apex by a heavy carmine veinlet; nervures carmine-red, heavier about the stigmal region, around the apex alternated with white; costa and a line on the commissure near the apex of the clavus, yellowish. Wings whitish-hyaline, with slender sanguineous nervures.

New York. Described from a single example beaten by me from a tree of the wild black cherry among the hills about twenty miles south of this city, on July 28th, 1892. This delicate little creature is a very interesting addition to our list of North American Derbidæ. Though quite distinct it is closely allied to the *A. Uhleri*, described in 1889, from Western New York specimens. (See CAN. ENT., Sept., 1889). The characters of genus *Amalopota*, founded by me for the latter species, must be somewhat modified for the reception of *Fitchi*, as in this species the ocelli seem to be wanting, while in the *Uhleri* they are quite distinct, though small and but poorly defined. This genus, though certainly valid, is very near *Anotia*, and forms a connecting link between it and *Otiocerus*.

2. *CICADULA SLOSSONI*, n. sp.

Form and ornamentation of *C. variata* nearly, but much smaller, with the vertex shorter and the black markings more elaborate. Length,  $2\frac{1}{2}$  to 3 mm.

Vertex  $\frac{1}{4}$  longer on the middle than next the eye, blunter before and more rounded in both directions than in *variata*. Whole head much more deeply and coarsely punctured, the clypeus a little more narrowed apically, and the outer margins of the cheeks under the eyes shorter and more deeply excavated, with the outer angles more prominent than in *variata*. Pronotum distinctly transversely wrinkled, omitting the broad posterior margin which is closely punctured; in *variata* the pronotum is nearly smooth and more convex. Sides of the pronotum shorter, with the lateral angles more rounded and the latero-posterior edges more oblique than in *variata*. Last ventral segment of the female long, closely appressed over the base of the pygofer, the hind margin slightly waved, not distinctly notched on the middle as in *variata*. Valve of the male shorter than in *variata*, with the apical margin but feebly arquated; the plates longer and with their attenuated points longer and less recurved than in the larger species.

Colour: Head yellow; vertex with a large oval black spot on each side including a yellow dot and sending a branch anteriorly to the eye, apex with two large transverse black spots; about four broken arcs on the base of the front, a cloud beneath the eye, all the sutures of the face and the median line black, the latter expanded on the apex of the clypeus and the disc of the front. Antennæ dusky. Pronotum tinged with yellow anteriorly and marked with black along the fore border, and a double brown longitudinal median band widening on the hind margin.

Scutellum black, with the tip, the lateral margins anteriorly, and a median line reaching only to the transverse impressed line, yellow. Elytra white, dusky toward the apex, marked as in *variata*, with oblique brown bands forming a lozenge anteriorly, including a pale commissural spot, and an x posteriorly with the tip of the clavus as its centre, the median bands being common to both marks. These brown bands do not attain the costal margin, and are more strongly distinguished than in *variata*. Abdomen and pleural pieces deep black, the margin of the tergal pieces slenderly yellow, venter sometimes yellow with the segments and connexivum bordered within their margins with blackish. Legs brown, the joints and tibial spines pale.

New York; New Hampshire. Described from three examples; one male taken by me at Lancaster, N. Y., July 12th, 1889, a female taken at "High Bridge," New York City, in June, by Mr. E. B. Southwick, and a second female taken on the summit of Mt. Washington by Mrs. Annie Trumbull Slosson, to whom I take pleasure in dedicating this pretty little species as a slight tribute to her persevering devotion to the study of entomology.

3. *CHLOROTETTIX NECOPINA*, *n. sp.*

Form and size of *tergatus* nearly. Vertex with a black transverse band between the eyes. Colour above greenish-testaceous, marked and clouded with brown; elytra fuscous, with strong white nervures. Length, 7 mm.

Vertex a little more produced than in *tergatus*, and the front proportionately longer and narrower; ocelli contiguous to the eyes. Last ventral segment of the female thin, broadly and deeply cleft nearly to its base; this incisure at its apex armed with a small blunt tooth, the lateral lobes ovate, in one example feebly angled at apex. Pygofers stout, very slightly exceeded by the oviduct, and armed with a few stout brown bristles. Other characters about as in *tergatus*.

Colour: Beneath pale greenish tinged with testaceous, especially on the front, which is marked on the sides by about ten nearly obsolete brown arcs, and two brown dots are at the base of the clypeus; eyes dark brown edged with pale. Vertex with a broad transverse blackish band just behind the ocelli. Pronotum testaceous, pale before and on the median line, either side of which is a brown cloud, and a smaller one occupies the latero-posterior angle, transverse wrinkles less distinct than in *tergatus*. Scutellum marked with a piceous triangular spot within the

basal angles, the median line, a dot on either side, and the impressed line brown. Tergum fuscous, testaceous on the sides, the segment, edged with pale. Elytra fuscous-brown, nervures conspicuous, white, brown at apex. Wings smoky, iridescent, nervures brown. Legs pale testaceous, claws and tip of the rostrum piceous.

Mississippi. Described from two female examples kindly sent me by Mr. Howard Evarts Weed.

This very distinct species is quite anomalous in the genus in which I have placed it by its dark colouring and conspicuous markings, thus allying it with *Limotettix parallelus*. In most of its characters, however, it is closely related to *Chlorotettix tergatus*, near which it must be placed.

#### 4. *ATHYSANUS EXTRUSUS*, n. sp.

Form of *A. variegatus*, Kirschb., broad and short; pale greyish-yellow, vertex with a transverse blackish band, elytral nervures pale. Length,  $4\frac{1}{2}$  mm.

Vertex longer and more pointed than in *obsoletus*, nearly  $\frac{1}{3}$  longer on the middle than next the eye; a broad transverse band on the disc and an angular spot at apex blackish, each bisected by the longitudinal median pale line. Face pale, front black with about eight pale arcs or pale with as many blackish arcs, sutures of the face and a double longitudinal line on the middle of the clypeus black; antennæ pale, set on a black cloud. Clypeus slightly narrowed to the truncated apex, its base arquated. Cheeks feebly angled without, exterior to the outer line of the loræ longitudinally wrinkled; tip of the rostrum black. Pronotum hardly longer than the vertex, mottled with dusky and showing four or five pale longitudinal lines, more or less obsolete; hind edge strongly concave, surface transversely wrinkled, broad anterior margin smooth and calloused; sides longer than in *obsoletus*, carinated; latero-posterior margins very oblique, almost continuous with the posterior margin. Scutelum with four or five brown spots, the posterior sometimes obsolete. Elytra short and broad, hardly exceeding the tip of the abdomen, pale, the areoles more or less heavily edged with fuscous. Abdomen brown or almost black, edge fulvous, with a few fulvous clouds beneath; pleural pieces brown, pale margined; legs pale, the femora banded with brown and the tibiæ dotted at the base of the spines. Valve of the male broad'y triangular, apex obtuse; plates irregularly quadrangular, widely spreading, touching only at base; outer angles produced, subacute, armed with a few long bristles; inner angles rounded; styles very long, extending for

half their length beyond the apex of the plates, ligulate in form and curved downward and outward at apex; pygofer rounded at apex, almost equalling the plates, the small anal aperture placed superiorly.

New York; Connecticut. Described from three males. One taken at Portage Falls, N. Y., May 30th, 1888. The other two specimens were taken by me in Connecticut in the spring of 1883. One of these was swept from weeds and bushes on the hills about Northford, June 26th; the other, a very deeply coloured example, I found in a grove on Prospect St. in New Haven, June 4th. The long extruded styles of the males will at once distinguish this from any other of our described species of *Athysanus*.

5. *ATHYSANUS INSTABILIS*, n. sp.

More elongated than most of our species of this genus. Black, irrorated and finely marked with pale yellow. Elytra pale, the areoles edged with fuscous. Length, 4-4½ mm.

Head obtusely pointed before; vertex about ⅓ longer on the middle than next the eye, passage to the front well rounded, base with a few impunctured areas. Ocelli large, fulvous, distant from the eyes; temples broad; front convex, the sutures arquated at the antennæ and incurved at apex; clypeus feebly narrowed towards its slightly rounded apex; cheeks rather narrow, but feebly angled, not exceeding the clypeus. Pronotum rather long, with the sides long and carinated, latero-posterior edges straight, angles prominent, obtuse, surface strongly punctured or shagreened. Elytra long, with the appendix well developed. Valve of the male short, obtuse at apex; plates forming an equilateral triangle, fulvous clouded with dusky, their edges nearly straight, fringed with pale bristles. Last ventral segment of the female slightly produced and rounded on the middle, feebly arquated either side within the short subacute lateral angles; pygofer rather small, slightly exceeded by the oviduct.

Colour black. Base of the vertex, outer edge of the cheeks, and margins of the eyes slenderly yellow. Two transverse spots on the disc of the vertex near its base, two lines anterior to these, one or two dots near each eye, an angled slender line on the apex including a dot behind, a dot on the temples, about six arcs, a basal spot and a longitudinal line on the front, the latter expanded against the base of the clypeus, and

a spot on each lora, fulvous-yellow; disc of the cheeks with a pale cloud which sends a branch along the upper edge of the lora to the front. Antennæ black, base of the seta pale. Pronotum irrorate and narrowly edged with pale, with a few irregular yellowish marks along the anterior border. Middle line of the scutellum, a curved mark either side of this on the basal field and the margins yellow, the latter interrupted at their middle. Narrow edges of the abdominal segments and the spines of the pygofers pale. Femora with a fulvous band; hind tibiæ yellow, dotted with piceous, the spines and claws whitish. Elytra soiled white, smoky at tip, nervures concolorous broadly bordered with fuscous, the costal and commissural pale.

Michigan; Colorado. Described from one male and three female examples taken at Agricultural College, Michigan, by my friend Mr. G. C. Davis, and another female received from Prof. C. P. Gillette, taken in Colorado.

This insect is nearly allied to the species described by me as *Athysanus striatulus*, Fall. (?), in Ent. Am., vi., p. 134, like which it has a well-developed elytral appendix. Two of the specimens before me have a second transverse nervure between the first and second sectors of the elytra, thus allying them to *Deltocephalus*, but for the present it seems better to place them in genus *Athysanus*.

Our described North American species of *Athysanus* may be arranged as follows:—

- A. Stout species with a short vertex and abbreviated elytra, without an appendix:—
  - 1. *A. obsoletus*, Kirch.    2. *A. extrusus*, Van D.    3. *A. comma*, Van D.    4. *A. plutonius*, Uhler.
- B. Smaller, more elongated species, with more produced subconical heads and longer elytra without an appendix:—
  - 5. *A. Curtisii*, Fitch.    6. *A. bicolor*, Van D.    7. *A. obtutus*, Van D.
- C. Species similar in form to those of the last section, but with a shorter head, flatter vertex, and longer elytra with a well-developed appendix:—
  - 8. *A. instabilis*, Van D.    9. *A. striatulus*, Fall. (?).



NOTES ON A POLYMORPHIC BUTTERFLY, *SYNCHLOE*  
*LACINIA*, GEYER (IN HUB. ZUTR.), WITH DESCRIPTION OF ITS PREPARATORY STAGES.

BY W. H. EDWARDS, COALBURGH, WEST VA.

"Godman and Salvin, Rhopal. I., p. 177, 1882, under the specific name *Lacinia*, place *Saundersii* and *Tellias*, Bates; *Quectela* and *Artema*, Reakirt; *Paupera*, Felder; *Mediatrix* and *Misera*, R. Felder; *Pretoria*, Boisduval; *Crocale*, Edwards; *Adjutrix*, Scudder, and *Adelina*, Staudinger; all of which they consider but inconstant forms of one species. From their works we quote: 'Between these extremes, *Adelina* and *Saundersii*, every gradation of colour can be traced, and all the rufous markings, as well as the yellow ones of the under side, can be exhibited in different individuals from their maximum development till they vanish altogether. . . . In the Southern States of North America, a form occurs which is very like *Saundersii*, and is prevalent in Texas. This is *Adjutrix*, Scudder, but we doubt the possibility of maintaining its distinction. In Arizona another form occurs, *Crocale*, Edw., which we take to be undistinguishable from *Adelina*, and therefore connected with the whole series.'" Quoted from E. M. Aaron, in Papilio IV., p. 177, in his paper entitled List of a Collection of Diurn. Lepid. from Southern Texas. Mr. Aaron adds: "Among these Texas captures were *Saundersii*, *Adjutrix* and *Mediatrix*; the latter two were taken in copulation."

I have not access to the works of Godman and Salvin, but Dr. Skinner informs me that they figure eleven forms of this species, and its localities extend even to Peru and Bolivia. These authors based their opinion as expressed not at all, so far as appears, from rearing the larvæ. Indeed, until recently, no one seems to have been acquainted with any of the preparatory stages, not only of *Lacinia*, but of any species of the genus *Synchlœ*. In 1892, Prof. Packard sent me in a tube with alcohol an adult larva and pupa, received by him from Prof. Tyler Townsend, of Las Cruces, N. M. In 1893, by the aid of Mr. T. D. A. Cockerell, also of Las Cruces, I have been able to study all the stages from egg to pupa. He wrote 7th July: "I saw a black and white butterfly, rather like a small *Limenitis* (was it not *Synchlœ* *Crocale*?) settle on two or three leaves of a sunflower." On 26th July: "Yesterday, Prof. Owen took me to his ranch, a short distance from Las Cruces, and I got there some *Crocale* larvæ, which I send herewith. I find that the young are gregarious, feeding as closely as they can stand on the upper side of a leaf of

*Helianthus*, which they skeletonize, instead of devouring the whole thickness, as older ones do. They remind me of the young larvæ of *Vanessa Urticæ*. The older larvæ I send are of a red variety. The larvæ are trimorphic, with forms as follows :

1. *nigra*, a black form.
2. *bicolor*, black with broad red dorsal stripe.
3. *rufa*, red form."

Again: "The *Helianthus* appears to be the common *H. annuus*. One finds several larvæ (adult) on one plant. Each has a leaf to itself, and they select the large leaves, not the young tops. They rest on the middle of the leaf, feeding by day, exposed to the sun. They must be inedible to birds, as they are very conspicuous. They gnaw holes out of the middle of the leaf. I could not see that they make any sort of web, and when alarmed they drop to the ground. At one place I found three or four, all black. One larva found on a narrow-leaved composite (not in flower) was about to pupate. It may have wandered from a sunflower, though there was none nearer than several yards. It was pupating quite exposed on the leaf."

On July 29th: "Yesterday, I found some batches of larvæ about one-half grown, still gregarious, and for the most part on the under side of the leaves. One batch was entirely of black larvæ, but another, to my surprise, contained all the variations mentioned in former letter. In the majority of cases a brood is all of one colour, but at least sometimes the three colours may all appear in one brood. I also enclose a *Crocale* butterfly which was caught and killed by a large Asilid fly (*Proctacanthus Philadelphicus*, Mocq.)"

Aug. 27th: "Yesterday I was in Juarey, Mexico (across the river opposite El Paso), and got a lot of insects. Among them both typical *Crocale* and the orange-shaped *Adjutrix*, as also a very pretty aberration, *rufescens*. I send all these herewith, as also what I call ab. *nigrescens*, an unusually black form of *Crocale* proper, which I bred here in Las Cruces."

There came two labelled *rufescens* and considerably unlike. One has a broad red band across both wings reaching nearly to costa of primaries, with marginal red spots on both wings; the other has the red band on hindwings one-half wider than usual and of deep colour, but there is nothing of it on forewing, nor are there marginal red spots. Both these varieties, I doubt not, have received species names. The bred *nigrescens*

has the spots that compose the white mesial band on hindwings reduced to mere streaks of white on the nervules. No doubt this has received a species name. But one of the Juarey examples is plainly *Ardema*, of Reakert: "hindwings black, with an indistinct orange-brown shade across the disk."

Mr. Cockerell wrote 9th Sept.: "On the college farm, yesterday, I found a batch of *Synchloe* eggs on the under side of a sunflower leaf. They are like the eggs I sent before. They are like the eggs of *Melitæa*, as figured by you in Butt. N. A. *Synchloe* seems to be practically a *Melitæa* in its earlier stages. I send one example of larva, black with numerous yellow-white dots, a sub-variety of the black type. I found several such."

During the season I had also received several batches of larvæ of *Phyciodes Carlota*, from Montana, and eggs of same from Colorado, and the larvæ from the *Crocalle* eggs were reared at same time with the others, so that I was able to compare the two species step by step. The eggs of the two are in no way distinguishable, nor are the larvæ in the first two stages; as regards shape and armature they are alike in the succeeding stages, but differ in coloration. But the pupa of the *Synchloe* is not like that of *Carlota*, which is of the typical *Phyciodes* shape and appearance, and like *Tharos*, but is closely like the pupa of *Melitæa Baroni*, as given in Butt. N. A., Vol. III., pt. 3. The stages are described as follows:—

EGG.—Similar to *Phyciodes Tharos*: obovoid, truncated at top, rounded at bottom, the lower three-fifths, or about that, examples varying, covered with irregular shallow indentations; the upper part ribbed, about twenty-four ribs, not much elevated, not sharp, the interspaces roundly and shallowly excavated; top slightly depressed; colour when first laid pale green, later changing to green-yellow. Laid in close clusters side by side in several rows. In the cluster under view each complete row (4) contained just nine eggs, and there were shorter rows on either side of these; on the top was part of another layer, placed irregularly and more or less on their sides. These eggs were believed to have been laid 8th Sept., or on the day when found, and hatched on 15th, or after six days.

YOUNG LARVA.—Length at one day from egg, .06 inch; cylindrical, even, each segment well rounded; furnished with many tapering black hairs, or processes, of which those on segments 3 and 4 are in cross line on the middle, four on either side above the spiracular line; on 2 is a black oval chitinous patch on top of dorsum, on which are six shorter

processes in line, and another on each side just below the patch; also two others in vertical row to the front and opposite the spiracle, on segments 5 to 12 inclusive six processes, three on either side, arranged in triangle as usual in the family; on the front of 13 are six in cross line, and the triangle on either side to the rear; along base of body one similar short process over each foot, two on 5 and 6 each, and one each to the remaining segments up to 12, in addition to which is a still shorter process over base of each proleg, and on 5, 6, 11 and 12 below the other; colour green, with a brown tint; head scarcely broader than 2, obovoid, slightly bilobed, shining black-brown, with scattered short processes over the face like those of body. Duration of this stage three days.

After first moult: Length at one day, .1 inch; colour variable, some examples being light brown with a green tint, some of brown of darker shades; the spines as in *Phyciodes*, rather short, slender and tapering, glossy black, with short bristles about them at a small angle, and rising from shining black tubercles; head cordate, glossy black, with many curved processes on the front. Duration of this stage, three days.

After second moult: Length at one day, .14 inch; colour variable, some larvæ being wholly black, some rust yellow, some of this last have on dorsum and lower half of side, a dark brown sub-dorsal band intervening; the spines rather longer in proportion than before, otherwise similar; head as before. Duration of this stage, three to four days.

After third moult: Length at one day, .3 inch; shape and spines as before; the colour as before, but the russet more red, and on those which are wholly russet are two black cross lines to each segment, one on the rear, the other at the junctions; head as before. To next moult, about four days.

After fourth moult: Length at one day, .52 inch; variable as before, the rust colour deepened into red-fulvous. At about six days was full-grown.

**MATURE LARVA.**—Length, .1 to 1.2 inch. Cylindrical, even; colour very variable, some being bright red-fulvous; at the junction of the segments a stripe of glossy black, and on 4 to 10 inclusive a narrow, dull black stripe near the rear of each; under side greenish-brown, as is also the front of 2; on the middle of 2 a dorsal chitinous collar, on which are six small spines, three on either side the mid-dorsal line; a little below these another; a long spine below the spiracle; the spines on the succeeding segments arranged as in *Melitæa*, black, shining, not long in pro

portion to the size of the body, rising from shining black tubercles, tapering to an irregular top, and surrounded by many short black bristles set at a small angle; head cordate, black, glossy, with many tapering hairs or processes on the face. Other examples are yellow-fulvous; others have a continuous red-fulvous band on dorsum, rather wider than the tubercles of the dorsal row of spines; or this band is macular, a rectangular spot being on each segment, bearing the spine; the lower part of side is also red-fulvous, and the intervening space is dark-brown, forming a sub-dorsal band the length of the body. The red on dorsum is sometimes reduced to a small patch on each segment, on rear. Others are black throughout, except that over the upper part are specks and minute spots of white or yellowish; others are black, but from the second lateral row of spines to basal ridge is a band of greenish-white and black, mottled, and sometimes the upper edge of this band shows a macular fulvous line. In all, the spines are black. There are at least three distinct types of larva:

1st.—All red- or yellow-fulvous.

2nd.—The dorsum and lower part of side fulvous; the subdorsal area dark-brown.

3rd.—All black, or black with a greenish band on side.

From fourth moult to pupation, about seven days.

**CHRYSLIS** —Length, .45 to .52 inch ♂; .55 to .64 inch ♀. In an example of which the length was .52, the breadth both at mesonotum and abdomen was .2 inch; cylindrical, shape of *Melitæa*; head case short, narrow at top, and a very little incurved, the sides excavated; mesonotum rounded both ways and rising to a slight prominence on the rear, but not carinated, followed by a slight depression; abdomen conical; the wing cases somewhat elevated, bevelled down to the abdomen on the margin; colour the first day white, pink-tinted, then becoming ivory-white, specked and spotted with black, with some black bands or stripes; a stripe across the top of head case, a band from end to end on the ventral side; some spots on the head case; on mesonotum two spots in front, two on rear, one on either side (at the tubercle); in some examples these are mere points, but in others large, and form a ring around the middle of the mesonotum; on the abdomen a black crescent on the anterior side of each tubercle; on middle of wing case a bent bar, two patches at hind margin, and several dots; the tubercles correspond to the spines of the larva, and are low, conical, orange. But there is great

variation in the size of the black marks, and there is every grade to a nearly black pupa, black marked with white. No two of the melanica examples were alike. Duration of this stage, five to seven days. By the above, it will appear that the pupæ also are polymorphic, some being almost wholly white, some almost wholly black, with all sorts of intergrades.

These resulted from the pupæ reared in July and August imagos which came out between 2nd August and 19th :—

|                                |    |                                   |
|--------------------------------|----|-----------------------------------|
| 1st.—From all red larvæ.....   | 3  | orange banded, or <i>Adjutrix</i> |
|                                | 8  | white banded, or <i>Crocale</i>   |
| 2nd.—From all black larvæ..... | 15 | <i>Adjutrix</i>                   |
|                                | 3  | <i>Crocale</i>                    |

From pupæ of the succeeding brood of larvæ, the imagos out between 29th August and 8th September :—

|                            |    |                                 |
|----------------------------|----|---------------------------------|
| 1st.—All red larva.....    | 4  | <i>Crocale</i>                  |
| 2nd.—All black larvæ.....  | 2  | <i>Crocale</i>                  |
|                            | 4  | <i>Adjutrix</i>                 |
| 3rd.—Red backed larvæ..... | 13 | <i>Crocale</i>                  |
|                            | 3  | <i>Adjutrix</i>                 |
|                            | 1  | with a very slight orange tint. |
|                            | 1  | very red and broad band.        |

The last brood of larvæ of the year, out of eggs hatched Sept. 15th, hibernated after third moult early in October. As this is exactly the habit of the *Phyciodes* (as *Nycteis* and *Carlota*), we may assume that the larvæ on their waking up early in spring, (Feb. or March, no doubt, at Las Cruces), would be in pupæ within two weeks thereafter, to give imagos a few days later. Probably, therefore, the butterflies are on the wing by April, and thereafter a brood will appear at least monthly. If this is so, the first larvæ received by me, in July, would have come from the third generation of butterflies of the year. This generation, from 29 pupæ, gave 18 *Adjutrix* imagos to 11 *Crocale*, or 62 per cent. *Adjutrix*, and 38 per cent. of *Crocale*. The following generation, from August larvæ, out of 28 pupæ gave 19 *Crocale* to 9 *Adjutrix* (including all red-banded), or 68 per cent. *Crocale* and 32 *Adjutrix*. The proportions in the two generations were nearly reversed, and as the season goes on there would seem to be a tendency to produce the white banded form. It will be of interest to watch the outcome of the hibernating larvæ, and I hope by Mr. Cockerell's aid next season to learn which form prevails in the two or three earliest generations.

As I am correcting the proof of this paper, I can add from a letter of Oct. 21st, from Mr. Cockerell ;—"The *Synchlœ* is still flying here in fair numbers. I find that in a state of nature the larvæ hibernate gregariously in the dead, curled up leaves of the sun-flower.

ON A SEEMINGLY MICROLEPIDOPTEROUS LEAF-MINER OF  
THE NARROW-LEAFED COTTONWOOD.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA, W. I.

In the same leaves of *Populus angustifolia* in which were found the tenthredinid (lepidopterous?) leaf-miners,\* in the Canada Alamosa, northern Sierra county, N. Mex., in June, 1892, there were also found specimens of a very distinct leaf-miner. It bears a striking resemblance to the leaf-miner of the vine found in the Mesilla valley of the Rio Grande. It possesses the sucker-like mouth of that miner. After being mounted in glycerine on a slide for several days, however, the outer portion of the distended sucker-like organ became transparent, exposing within what appear to be two stout rounded mandibles with teeth on their inner edges.

Since this miner is footless, and yet possesses toothed mandibles, I infer that it is microlepidopterous. It mines on the lower side of the leaf, not being visible from above.

*Description of miner.*—Length,  $3\frac{1}{2}$  mm. Colour entirely white. Whole larva fleshy, consisting of thirteen segments. Widest anteriorly, narrowing posteriorly. Segments laterally rounded, the anterior ones especially projecting on sides, the body being laterally deeply incised at sutures. Head rather triangular in shape, running to a blunt point anteriorly, widest behind—where it is less than  $\frac{2}{3}$  the width of prothoracic segment. Anterior end of head terminated with a sucker-like organ distally distended, constricted at base into a neck-like junction with the head, enclosing and concealing a pair of apparently corneous jaws or mandibles. Mandibles are a little longer than wide, rounded-oblong, furnished on inner edge with three recurved or posteriorly directed teeth. Antennæ springing from anterior lateral edge of head just posterior to the neck-like constriction of the sucker-like capsule which encloses the mouth-parts. The antennæ are apparently 4-jointed, but possess some supernumerary bud-like joints. First two joints about same length, the basal one slightly thicker; third joint less than half as thick and shorter than second, accompanied by two slender bud-like or tooth-like joints which spring from the second joint and are shorter and narrower than third joint. Fourth joint a little shorter and smaller than third, about size of the supernumerary joints just described, accompanied by a shorter super-

\*See article "Another leaf-miner of *Populus*," in Journ. N. Y. Ent. Soc., Vol. I,

numery joint which is terminated by a bristle. Eyes situated immediately behind base of antennæ, on outer edge of head, appearing as a black dot with three other dots in a row behind. Prothoracic segment widest; mesothoracic and metathoracic segments about same width, and a little narrower; segments 5 to 7 about equal, and much narrower than thoracic segments; 8 to 11 successively and gradually narrowing, 12 a little longer than 11; 13 widened, especially posteriorly, narrowing anteriorly, incised on lateral edge. All the segments nearly the same length, the posterior ones more elongate for their width. head longer than prothoracic segment. Surface of body very thinly clothed with a few fine moderately long hairs, some on head. Feet and legs entirely absent.

Described from an alcoholic specimen in a glycerine mount. A second specimen, about the same size, has the segments more approximated, body hardly as tapering posteriorly, lateral incisures hardly as deep, and the anal segment not widened. It is, perhaps, the same species. Canada Alamosa, June 17.

#### ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held in its rooms in Victoria Hall, London, on the 11th and 12th of October, the vice-president, Mr. J. M. Denton, occupying the chair in the absence of Mr. Harrington, the president, who was unfortunately unable to be present. The reports of the treasurer, librarian and curator, the council, the botanical, ornithological, geological and microscopical sections were read and approved. Several interesting papers were read and addresses delivered. A number of rare and remarkable specimens were exhibited. Full reports of the proceedings will be published in the forthcoming annual report to the Legislature of Ontario.

The following gentlemen were elected officers for the ensuing year:—

President—W. Hague Harrington, Ottawa.

Vice-President—J. Dearness, London.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors—Division 1—James Fletcher, F. L. S., F. R. S. C., Ottawa.

“ 2—Rev. C. J. S. Bethune, F. R. S. C., Port Hope.

“ 3—Gamble Geddes, Toronto.

“ 4—A. H. Kilman, Ridgeway.

“ 5—R. W. Rennie, London.



Librarian and Curator—J. Alston Moffat, London.

Editor of the CANADIAN ENTOMOLOGIST—Rev. C. J. S. Bethune, M.A., D. C. L., Port Hope.

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Delegate to the Royal Society—Rev. T. W. Fyles, South Quebec.

Committee on Field Days—Dr. Wolverton, Messrs. Clement, Elliott and Stevenson, London.

Auditors—J. H. Bowman and J. M. Denton, London.

### HYBLÆA PUERA, CRAMER.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

Mr. Butler (P. Z. S., 1892, p. 133) remarks concerning the *Hyblæidæ* (*Hyblæinæ*, I would rather write) as follows :—

“The position of this family is somewhat doubtful ; the aspect of the species forcibly reminds one of the Tortrices, but the neuration does not altogether correspond with that of the *Tortricidæ* ; at the same time the *Hyblæidæ* do not appear to be true Noctuites.” How this may be, I cannot venture to judge, but *H. pueræ* is very common in Kingston, Jamaica, and as I have bred it, a description of the larva may help to decide the question.

*Larva* : about 19 mm. long, rather reminding one of the *megacephala* group of *Acronycta*. Body cylindrical, with sparse hairs of moderate length. Head shining pitchy-black. Body black above, with a more or less interrupted red dorsal stripe ; and very narrow subdorsal white stripes, much broken into spots. The black continues as far down as the spiracles, but just above the spiracles is another broken white line, like the subdorsal. There is a narrow yellowish-white band along the lower margin of the black, and below this the body is marbled with grey and pale reddish-brown, a small hair-patch below each spiracle being ringed with white. Abdominal legs pale brown. Thoracic legs shining red-brown. The first 3 and the last body-segments are almost entirely black beneath. Lives in curled-up leaves of *Catalpa*, in which it pupates.

*Pupa* bright red-brown.

Larva and pupa found in Kingston, May 3, 1892. Three moths emerged on May 10.

Mr. J. J. Bowrey has briefly referred to the larva in Handbook of Jamaica, 1881, p. 118. Moeschler, in his Porto Rico work, says the larva is found on *Crescentia* and *Tecoma*. The distribution of the insect is extraordinary—West Indies, Brazil, Java, Ceylon, Nepal, China, S. Africa, Madagascar, Mauritius, etc.

## BOOK NOTICES.

EXPERIMENTAL FARMS: REPORTS FOR 1892. Printed by order of Parliament: Ottawa, 1893.

This valuable "Blue-book" has been before us for some time, having been distributed in April last, but various circumstances have prevented us from noticing it and several other publications, for which we are indebted to the courtesy of the authors. Our readers will, of course, be chiefly interested in the report of Mr. James Fletcher, the Entomologist and Botanist of the Central Experimental Farm at Ottawa, which occupies twenty-four pages of the volume. After mentioning the chief insect attacks of the year, Mr. Fletcher gives an interesting and valuable account of the life-histories of the Hop-vine Borer (*Hydracia immanis*, Guén.), the Red Turnip-beetle (*Entomoscelis adonidis*, Fab.), the Western Blister-beetle (*Cantharis Nuttalli*, Say), and the Birch Bucculatrix (*B. Canadensisella*, Chamb.); in these there is much new and original matter, as well as a summary of the previous observations of others. The identification of the hop insect, which is also called, from its mode of attack, the "Collar-worm of the Hop," is particularly interesting. Its injuries have been observed for more than twenty years, but it was a long time before the moth was reared from the destructive larvæ and its identity established. The most effective remedy for this insect appears to be the encouragement of the unsavory skunk in the hop-yards; in the northern part of the State of New York and in Wisconsin, this animal has been found most useful from its habit of digging round the infested plants and devouring the worms. The turnip and blister-beetles referred to have been very destructive in the Northwest Territories, the latter attacking the Windsor Bean, while the Birch Bucculatrix has infested the trees in the neighbourhood of Ottawa. Mr. Fletcher also describes several useful parasites which serve to keep in check the currant and willow saw-flies and other injurious insects. The remainder of his report is devoted to an account of the potato-blight which affects the leaves of the plant, and the potato-rot affecting the tubers, and a chapter on lawn grasses and fodder plants.

CATALOGUE OF THE LEPIDOPTEROUS SUPER-FAMILY NOCTUIDÆ FOUND IN BOREAL AMERICA: By John B. Smith, Sc. D.: (Bulletin No. 44 of the United States National Museum). Smithsonian Institution, Washington, 1893.

This volume of four hundred and twenty-four pages will be heartily welcomed by every student of the Noctuidæ of North America. It is not a mere list of species, but a complete bibliographical and synonymical

catalogue. The authority, date and reference are given for each genus, and under each species are given the date, author and place of publication of the original description, followed by any other published references, the synonymy, habitat, and where the type can be found. Anyone who has attempted to keep a record of the published references to our Lepidoptera—and we have all been compelled to do so in some form or other—will appreciate the immense amount of labour that Prof. Smith has performed in the preparation of this work, and must feel heartily grateful that he has now relieved us of a task that few are competent to accomplish satisfactorily. The saving of time, and the satisfaction of knowing that one is not now likely to overlook anything that has been published regarding a species, are no small boons to the student. For a full explanation of the origin and purpose of the work, we must refer the reader to Prof. Smith's somewhat lengthy preface, which will be found well deserving of careful perusal. The general index at the end of the volume makes the work complete, and we have no hesitation in saying that it is the most useful publication on the North American Noctuidæ that has yet been issued from the press. We trust that the author will before long be able to lay us under still greater obligations to him by the publication of his contemplated monograph of the whole of this family of moths.

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### CORRESPONDENCE.

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#### CORRECTION.

Sir,—In my last paper, "Washington Tenthredinidæ, etc." I find that I have made the following mistakes:—Page 238, line 13 from top, 23 from top, and page 239, line 6 from bottom, the word *labium* should in each case be *labrum*.

A. D. MACGILLIVRAY.

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#### CALLIDRYAS EUBULE.

Sir,—On the 5th of October last I observed a bright yellow butterfly, much larger than any of our species of *Colias*, flying in the street here, but it soon passed out of sight over some houses. On the 9th inst. I observed some others, and at last succeeded in capturing what proved, to my great delight, to be a specimen of *Callidryas Eubule*, the first taken in the State of Iowa. Hitherto it has not been seen north of Missouri; though I have collected in this State for ten years, I have never met with this butterfly before, but now I have taken no less than four specimens, all females, and so fresh that they look as if they had just emerged from the chrysalis. Keota is built upon "the divide," and is ten miles either north or south from any heavy belt of timber, or any large stream of water. These specimens must therefore be "wind-visitors," as Mr. Grote terms them, and have been wafted here by the air-currents from the south.

A. S. VAN WINKLE, Keota, Iowa.

Mailed November 4th.

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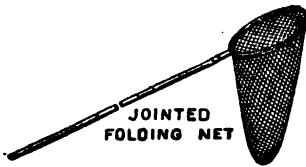
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PROF. J. B. SMITH, New Brunswick, N. J., is engaged in a monographic revision of the Deltoid group of the Noctuidæ, and desires material from all parts of the country. He will name and return all material sent him, for the privilege of retaining such specimens as may be needed for description or for completing the collection of the U. S. National Museum.

# The Canadian Entomologist.

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## NOTES ON THE OCCURRENCE OF *HEPIALUS THULE*, STRECKER, AT MONTREAL.\*

BY H. H. LYMAN, M. A., MONTREAL.

In the part of Mr. Strecker's Lepidoptera, Indigenous and Exotic, dated Feb. 22nd, 1875, is the description, and on the accompanying plate an excellent figure, of this species from a female sent to that author by the late Mr. Caulfield, and which was probably taken in the previous summer. The specimen was found in Phillips Square, which is about two miles from its nearest known locality, by the caretaker, from whom it passed to the taxidermist of the Natural History Society, who gave it to Mr. Caulfield.

From that time I can find no further record of its capture till that given in the Feb., 1884, number of the CANADIAN ENTOMOLOGIST (Vol. XVI., 39), by the late Mr. Bowles, who recorded having received a specimen of it during the previous year, 1883. He also stated in the same note that Mr. J. G. Jack, of Chateauguay Basin, P. Q., had also a very beautiful specimen of this moth, presumably taken in that locality.

In 1889, when looking into this matter, I wrote to Mr. Jack, at Jamaica Plain, informing him that I had found it recorded in the old minute book of the Montreal Branch that he had found the larva of what was probably a large species of *Hepialus* at Chateauguay, and asking him for particulars about this matter, and especially whether he had ever succeeding in rearing the larva to imago, or had taken this species there, and mentioning what Mr. Bowles had published in 1884. To this letter Mr. Jack replied that for two or three years in succession he had found a larva which he believed to be a *Hepialus* in the stems of *Acer Spicatum*, and one in a stem of *A. Rubrum*, and another in that of *A. Pennsylvanicum*; that the stems in which they were found were from one to two inches in diameter; that the borings extended from about a foot above the surface of the ground down into the rootstock, and that the point of exit

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\* Read before the meeting of the Entomological Club of the American Association for the Advancement of Science, at Madison, Wisconsin, August, 1893.



was usually but a few inches above the surface of the ground; that the larvæ were searched for and found in late fall or early winter, and that though about a dozen were found he did not succeed in breeding the imago; and finally that he never took *H. Thule* anywhere, but exchanged with the late Mr. Shaw, of Montreal, for a nice specimen which he afterwards gave to the Museum at Cambridge, Mass.

No further specimens, so far as I have been able to ascertain, were taken till 1885, in which year Mr. Shaw was so fortunate as to secure nine specimens. Mr. Shaw, to the great regret of our members in the Montreal Branch, died in 1886, and I was therefore unable to learn any further particulars from him.

In 1887 I searched in vain for the species, but in 1888 I was successful in discovering it, and took twelve specimens.

The locality where I discovered it, and which was probably the same as where Mr. Shaw had found it, is the brow of the old sea terrace of the post-pliocene period which extends for some miles east and west of Montreal, at a point in the municipality of Côte St. Antoine on the western outskirts of Montreal, and just above the St. Henry Swamp. I only found it in a very limited portion of this locality, not more than 400 or 500 feet in length, and supposed it was restricted to this very small area.

In 1889 I only secured six specimens, though I visited the locality much oftener, and in 1890 one just before starting on a trip across the continent, while in 1891 I only obtained two, and one other was taken by Mr. Winn.

From these facts I feared it was doomed to extinction in this locality, as the Canadian Pacific Railway runs along the brow of the terrace, and the swamp at its base is being drained and cultivated, and will be built over in a few years.

But last year we learned from one of our members that he had taken the species about three miles further west, but on the level swampy tract below the terrace, and some of our members went out on 15th July and two specimens were secured. This year Mr. Winn has traced it out all along this terrace, so that its range is much more extensive than we supposed.

The earliest date upon which I have taken it is 6th July, and the latest upon which I have heard of its being taken is 20th July of this year, but the specimens were worn and ragged.

The species seems to fly only for about fifteen to twenty minutes in

the twilight, as I have never taken it before ten minutes past eight, nor ever after half-past eight. Bright, clear evenings I have found much more favourable than cloudy ones, though I have visited the locality on many evenings without seeing one.

I have never succeeded in seeing where they came from, though I have stood watching intently for them for fifteen minutes or more before they appeared, but suddenly two or three would be in the air together, often out of reach of the net, swinging back and forth in their peculiar oscillating manner, though single individuals have been taken by others while flying along near the ground.

If touched by the net without being caught, they would drop into the grass apparently quite helpless. Six-sevenths of those which I have taken were males, but others have secured a more even division of the sexes.

One of the specimens taken in 1891 was a female, which I kept alive in order to secure eggs. It laid freely an enormous number, and I do not know whether it might not have laid more had it been kept alive longer. It was kept alive for two days in a wooden box, with gauze over the top, and seemed to hang perfectly quiet and to allow the eggs to run from her, as they were not attached, but loose in the bottom of the box. At the end of this time she was found to have been knocking about and spoiling her wings, and so was killed. The eggs were counted very carefully, and were found to amount to the enormous number of 2,151.

The following description was taken :—

Length, .027 of an inch.

Breadth, .022 of an inch.

Even oval, slightly flattened on lower side, perfectly smooth, but dull, like unglazed porcelain.

Colour, a pale honey-yellow when laid, soon turning black.

This female, however, must have been virgin, as the eggs speedily shrivelled, so that I was unable to obtain the young larvæ, or to make any of the experiments which I had contemplated in the direction of placing the eggs upon any likely food-plant. In connection with this subject several questions of great interest arise. It is well known that the moths of this family are very abundant in the Old World, one especially, *Hepialus Velleda*, swarming in Scotland in myriads, yet though we have a great many species on this continent, I do not think that any one can be considered other than very rare, except *H. Mustelinus*, which Packard reported (Proc. Ent. Soc., Phil., III., 394), as not uncommon at

Brunswick, Me., at light, and *H. Argenteomaculatus*, which is stated to be pretty generally distributed, though it is certainly not common in the imago state.\*

Now, if the females in this genus produce over two thousand eggs each, it can be easily understood why they are so abundant in Europe, but why are they so rare on this continent?

Mr. D. S. Kellicott, who discovered the larva and pupa of *H. Argenteomaculatus*, found that that species bored in the roots of *Alnus incana*, but came up into the stem when mature, and Prof. J. B. Smith stated that it bred also in oak, willow and poplar. Mr. Kellicott stated in his paper upon this subject, which he read before this club at the Cleveland meeting, that after these nearly mature larvæ had come up into the stem, large numbers of them were destroyed by woodpeckers.

Upon reading this, it occurred to me that possibly this furnished the key to the mystery of the scarcity of these moths on this continent, and I therefore wrote to an ornithological acquaintance to ask if woodpeckers were more abundant on this continent than in the Old World. This gentleman replied that while he had no definite knowledge upon that question, he should judge that we had in Canada ten to twenty times as many woodpeckers to the square mile as they had in England.

I must, however, confess that even if this estimate be correct it is not an entirely satisfactory explanation, as there are on this continent a number of small species in this genus which no doubt feed in the roots of shrubs or herbaceous plants where woodpeckers would not be likely to find them, which are quite as rare as the larger species. I also wrote to Dr. Strecker to learn whether, so far as he knew, *Thule* had ever been found in any other locality than Montreal, to which he replied as follows:—"Some years since, an example of *Hepialus Thule* was taken somewhere in Wisconsin, I don't recollect where or by whom, but a sketch was sent me at the time for identification, which I immediately recognized as that species."

In regard to the life-history of the species in this genus, the English entomologists to whose works I have access are extremely vague. Stainton, in his Manual I., 109, says of the genus, "Larva feeding on the roots of plants," which leaves it very indefinite as to whether he means in the roots or tunneling in the earth and feeding on the roots. He even says that the larva of *H. Hectus* feeds on the leaves of dandelion, and F. O. Morris says "on the dandelion." Newman, "British Moths," does not commit himself as to *Hectus*, but of most of the others he says "on roots," but of *H. Velleda* he says "in the subterranean rhizome of the common brake, (*Pteris aquilina*)."

In spite of the very loose statements of English entomologists, I think there can be no doubt that the larvæ of this genus are internal feeders, as stated by both Harris and Packard.

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\*Since writing this paper Prof. J. B. Smith has called my attention to the fact that *H. McGlashani* is very abundant. See Ent. Amer., II., 15.

## ON SOME UNDETERMINED BOMBYCES.

BY HARRISON G. DYAR, NEW YORK.

THIA (THELETHIA) EXTRANEA, Hy. Edw.

Mr. Andrew Bolter, of Chicago, has kindly sent me the type of this species for examination. It proves to belong to none of our families of Bombyces, as I had suspected. (See Journal N. Y. Ent. Soc., I., 98). On comparing the venation with *Pseudanaphora arcanella*, Clem.,\* I find it to be essentially the same, differing only in details. Vein 2 of the secondaries is more remote from vein 3 in Thia than in Pseudanaphora, the lower fork of the discal vein ends between veins 4 and 5 instead of at origin of vein 4, and veins 5 and 6 arise from a common point instead of being well separated. Vein 8 (costal) present in both, strong, distinct, free, not 'apparently none.' On the fore-wings the venation is very similar in both. The second internal vein (submedian) is weak; the first strongly furcate at base. All the venules free, unbranched. Subcostal vein very remote from the costa, all closely as in Pseudanaphora.

The fore-wings of this little moth are closely and heavily scaled above, glossy black; below of a gray brown, the veins slightly discoloured, the costa and fringe black. Hind-wings nearly hyaline, with but a few scattering scales; the fringe well developed, black.

Body parts black, the tongue pale, contrasting.

As the name Thia has been used before in entomology, the present Tineid genus may be known as *Thelethia*.

## CISTHENE (CLEMENSIA) LACTEA, Stretch.

Mr. Beutenmüller has discovered a specimen of this species in the Edwards collection, without label. So far as I have been able to examine it, it does not violate the characters of Cisthene, but its coloration is so different from the other species of the genus that I would prefer to place it in Clemensia, with which it agrees perhaps equally well structurally.

## PSEUDOPSYCHE (OEDONIA) EXIGUA, Hy. Edw.

According to the present arrangement, the synonymy of this species is as follows:—

Family, PSYCHIDÆ.

Genus, OEDONIA, Kirby.

---

\*Determined by Prof. C. H. Fernald.

1893, Kirby, Cat. Lep. Het., I. 524.

|| *Pseudopsyche*, Hy. Edw.

1882, Hy. Edw., Papilio, II., 124.

O. EXIGUA, Hy. Edwards.

1882, Hy. Edw., Papilio, II., 125.

No characters have been published which would allow of giving the genus *Oedonia* a family location. Its reference to the Psychidæ is probably due to its colour only. The statement that the pectinations of the antennæ are furcate at the tips I am unable to verify, and I regard it as erroneous. The other characters which have been given are general ones.

I have examined Mr. Neumoegen's specimen, by the kind permission of that gentleman, and present my notes on the venation, as they may be of assistance to some one :—

*Primaries*.—Vein 1 free, straight, simple, not furcate at base, remote from internal margin; median vein 4-branched, vein 2 arising beyond the middle of cell; all the venules, veins 3 to 11 inclusive, simple, unbranched, arising independently and nearly equidistant from each other from the end of the cell. The cell is oval in shape, pointed at base. Vein 12 from the base of wing, free, about midway between the subcostal vein and costa.

*Secondaries*.—Three internal veins. (I am unable to make out vein 1a positively, owing to the condition of the specimen and to the fact that I cannot bleach the wing. Veins 1b and 1c are present, the latter in the normal position of the submedian fold). Median vein 4-branched, cell closed, the cross vein angulated between veins 5 and 6, with a discal fold from the angulation. Vein 6 arises half way from the angulation to the apex of cell, vein 7 from apex of cell; vein 8 free from base, straight. The frenulum consists of a minute spine, apparently without any costal loop on primaries. The exact location of this genus I will leave to students of the Microlepidoptera. One of the type specimens is in the Edwards collection in the American Museum of Natural History, New York, the other in the collection of Mr. B. Neumoegen.

LIMACODES FERRIGERA, Walker.

Mr. A. G. Butler has very kindly sent me a good coloured figure of the type in the British Museum, and it proves to be *Adoneta spinuloides*, Clem.

## GLUPHISIA SEPTENTRIONALIS, Walker.

## DASYCHIRA CLANDESTINA, Walker.

Both these names refer to *G. trilineata*, Pack., and both antedate it. Mr. Butler has sent me a sketch of *septrionalis* and notes on it, and Mr. J. A. Moffat has compared the type of *clandestina* with specimens of *trilineata*, and writes me that "it is, so far as I can make out, almost identical with what we have under the name of *Gluphisia trilineata*." The synonymy will be :—

*G. SEPTENTRIONALIS*, Walker.

1855, Walker, Cat. Brit. Mus., IV., 1038, *Gluphisia* ?

1882, Grote, check list, p. 18, *pr. syn. trilineata* ?

*clandestina*, Walker.

1861, Walker, Can. Nat. & Geol., VI., 36, *Dasychira*.

1877, Grote, Can. Ent., IX., 21, *Gluphisia*.

*trilineata*, Packard.

1864, Packard, Proc. Ent. Soc. Phil., III., 355.

*ICHTHYURA APICALIS*, Walker.

As suggested by Dr. Packard (Ent. News, IV., 79), this species proves to be *I. vau*. Mr. Butler has sent me a coloured figure of it. The name takes precedence, and we have :—

*I. APICALIS*, Walker.

1855, Walker, Cat. Brit. Mus., V., 1058.

*vau*, Fitch.

1859, Fitch, 5th Rept. Nox. Ins. N. Y., 65.

*indentata*, Packard.

1864, Pack., Proc. Ent. Soc. Phil., III., 352.

*ornata*, Grote and Robinson.

1868, G. and R., Trans. Am. Ent. Soc., II., 191.

*incarcerata*, Boisduval.

1868, Boisd., Am. Soc. Ent. Belg., XII., 86.

Not to mention the synonymy of the paler form.

*CERTILA FLEXUOSA*, Walker.

I have shown Mr. Butler's figure of this to Prof. J. B. Smith, and he feels sure that it represents *Raphia frater*. This removes the name from the list of undetermined Bombyces.

Mr. Butler deserves hearty thanks for his kindness in assisting us to determine these names.

THE MESILLA VALLEY COTTONWOOD LEAF-MINER  
DETERMINED.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA.

Among the first insects which I found upon my arrival in the Mesilla Valley of New Mexico, in March, 1891, was a small sawfly. My notes on this species were made as follows at the time :—

March, 1891.—Specimens of a small yellowish and brownish sawfly were found quite abundant flying everywhere from middle to last of March. They were not found on any plant, but their numbers make it probable that they will turn up as injurious to some plant. Det. by Dr. Riley as *Blennocampa*, nov. sp.

In an article in *Zoe.*, vol. iii., p. 234–6, Oct., 1892, under the title of a leaf-miner of *Populus fremontii*, I described the larvæ, there supposed to be tineid, and gave an account of their great destructiveness to the foliage of these trees in the Mesilla Valley in 1891 and 1892. All attempts to breed the miner were futile.

However, in April, 1893, the trees were watched carefully during the time when the leaves were opening. The result was that on April 9th, adult sawflies were found very numerous on the cottonwoods, flying about and (apparently) ovipositing in the partially opened leaf bunches. The leaves were one-third to one-half opened at the time.

Specimens of these sawflies were captured on the spot. On being carefully compared with the specimens taken in March, 1891, which, as above mentioned, had been determined by Dr. Riley as a new species of *Blennocampa*, they were found to be the same. Dr. Riley has since expressed doubt *in litt.* that the two were the same. Though I did not breed the species, I am sure quite beyond any doubt that the sawflies caught April 9, 1893, are the adults of the leaf-miner referred to as described in *Zoe.* I am quite as certain also of the identity of these sawflies with the *Blennocampa*, n. sp., determined in 1891 by Dr. Riley.

Dr. Riley has given me *in litt.* the MS. name *Blennocampa populi-foliella* to use for this species. I therefore place these notes on record, so that my stand in the matter may be known. It appears that the precise name of the cottonwood of the Mesilla Valley is *Populus fremontii*, Watson, var. *wislizeni*, Watson, as Prof. Cockerell has pointed out to me. (See Bull. 2, Forestry Division, U. S. Dept. Agric., 1889, p. 188).

I should also point out that I found in New Mexico other tenthredinid (?) leaf-mining larvæ in *Populus angustifolia*, in the Canada Alamosa (see Journ. N. Y. Ent. Soc., i., No. 2), which belong to a different genus without doubt.

DESCRIPTIONS OF SOME SPECIES OF COLEOPTERA  
OCCURRING NEAR ALLEGHENY, HERETOFORE  
UNDESCRIBED.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Preparatory to the publication of a list of the Coleoptera of this vicinity, it has been thought proper to characterize and name the following forms :—

*Bembidium postfasciatum*.—Coppery-bronzed, dark beneath, elytra pallid, two dark fasciæ. Head convex, impunctate, longitudinally impressed on each side between the eyes, coppery-bronzed; antennæ with three basal joints pale, the others fuscous; thorax quadrate, base and length equal, wider at middle, base truncate, basal striæ double, hind angles rectangular, carinate, dorsal line deep, coppery-bronzed, often tinted green in the basal impressions; elytra pallid, silvery white in life, elongate oval, broadly deeply impressed transversely behind scutellum, deeply striate, striæ dilated before middle and coarsely punctured, punctures finer towards apex, intervals convex, third bipunctate, a broad undulated dark fascia behind middle, another before apex sometimes interrupted at the suture and sides; underside dark, often with a greenish reflection; legs entirely pallid. Length, .18-.21 inch. Characterized from 8 examples. Habitat: Palludial places along streams; not common, but abundant when found. This species has been distributed as a variety of *dorsale*, Say, from which it is abundantly distinct; in that species the head and thorax are brilliant green, the impressions of the thorax less dilated, the striæ of the elytra finer, not dilated near base and with finer punctures, the intervals flat; the fasciæ narrower and less conspicuous, a greenish space around the scutellum and scarcely evidence of a transverse impression.

*Platynus parmarginatus*.—Elongate, depressed, dark above, antennæ, mouth parts, underside, epipleuræ and reflexed margins of thorax ferruginous, with a tendency to piceous on the abdomen. Head with deep frontal impressions, a little narrower than the thorax within the marginal reflexions; thorax quadrate, widest at middle, narrowed to apex and base by a curved line, anterior angles prominent, obtusely rounded, posterior obtuse, side-margins uniformly and widely reflexed, discal line fine not reaching base, length and greatest width equal; elytra deeply sinuate at apex, striate, intervals convex, the third with four punctures. Length, .30-.38 inch. Characterized from 30 examples. Habitat:



Channels of spring runs on hills dry in summer; not common, but abundant when found. This has been distributed as a variety of *reflexus*, Lec., from which it is very distinct, the latter being much larger, with a more elongate and differently shaped thorax, tripunctate elytra, and piceous underside and legs. *P. cinctus* has the same form of thorax with *parmarginatus*, but the reflexed margin of the thorax is much narrower anteriorly than posteriorly; the thorax of *reflexus* is perceptibly longer, a little coarctate on the sides before base, widest one-third from apex, and may be termed lyriform.

*Stenelophus humidus*.—Piceous black, shining, basal joint of antennæ and feet pale. Head short, two-thirds as wide as thorax, smooth, antennæ brown except basal joint, very pilose; thorax quadrate, a little narrowed behind, sides curved, basal angles rounded, scarcely obtuse, impunctate, discal line fine, sometimes obsolete, basal impressions shallow, impunctate, often with minute rugæ, lateral edge narrowly ferrugineous; elytra with impunctate striæ, intervals scarcely convex, the third with a minute puncture at apical third, somewhat iridescent, extreme sutural and marginal edge sometimes pale; scutellar striæ at most rudimentary, frequently invisible; in the ♂, middle and anterior tarsi have the fourth joints deeply bilobed. Length, .18–.20 inch. Characterized from 15 examples. Habitat: Grassy swampy places in meadows and about springs. Abundant. Distinct from *S. plebeius*, which it closest resembles, by its smaller size, less rounded thorax, obsolete scutellar striæ, and other characters seen on comparison. This species has been distributed as *Stenelophus*, N. S.

*Soronia substriata*.—Oval, length twice the width, much depressed, pubescent, sordid, rufescent.

Head finely punctulate, a transverse row of minute tubercles and some scattering ones, antennæ brown, fourth joint scarcely shorter than third, antennal grooves nearly parallel; thorax two and one-half times wider than long, apex deeply emarginate, base truncate, sides regularly curved, incurved a little at base, side margins widely explanate and moderately reflexed, medial line indistinct, surface not indented, densely finely punctured to the extreme margin, pubescence fine and matted together on the disk with a brown indument producing a granulated appearance; elytra widest at the base, sides forming with those of the thorax, except the sinuation at base, a regular oval curve and with continuous broad reflexed margins, feebly costate or substriate, densely finely punctured, setose,

pubescence dense, very short and matted on the disk with indument, the margins translucent when cleaned; beneath shining, rufopiceous, undermargin of thorax and elytra very broad and smooth, and with the venter very densely, scarcely visibly punctate. The mentum and its appendages are different from those in the other species, but to be understood a figure is necessary; the stria arrangement is more distinct than in *undulata* or the European *grisea*; there is no appearance of maculation except from abrasion. The indument, whether natural or acquired, could probably be removed like that on *grisea* by washing with ammonia, and when cleaned the surface would be rufous. Only two examples occurred in May under maple (*Acer rubrum*) bark.

*Corymbites elongaticollis*.—Black, sericeo-pubescent; head coarsely confluent punctured, front a little depressed, antennæ, ♂ a little longer than head and thorax, ♀ a little shorter, serrate from the second joint, 3rd scarcely longer than 4th, 11th constricted slightly near tip; thorax one-half longer than wide, not very convex, a little roundly narrowed from middle to apex, slightly constricted before the hind angles which are divaricate and carinate, obsoletely canaliculate at base or not, finely and closely punctured especially on the sides, a little shining when the pubescence is rubbed off; elytra not wider than thorax than which they are twice longer, uniformly narrowed from base, striæ of moderate depth, intervals convex and closely punctured with fine punctures causing a rugous appearance, finely sericeo-pubescent; femora and tibiæ piceous; tarsi rufescent beneath, very slender, 1st joint just perceptibly longer than 2nd, 5th as long as 3rd and 4th conjointly; abdomen sericeous, finely densely punctulate, prothorax and side pieces more coarsely. Length, .32-.45 inch. Described from six examples; not uncommon in Western Pennsylvania, and I took an example at Parry Sound, Ontario. It varies greatly in size. In the series it should be placed near *tarsalis* or *mendax*.

*Hemiptychus castaneus*.—Elongate-oval, widest at base of thorax and elytra, rufocastaneous, pruinously pubescent, excessively finely punctulate; thorax at base sinuate each side of middle, obliquely truncate and separated externally from the base of the elytra by an indentation for the knees of the middle feet, external two striæ finely impressed from the middle continuously around the apex uniting with the short apical impressions of the 1st and 2nd striæ, and in two examples traceable anteriorly to the humerus, from which in one of these is an evident third

stria ending at the middle; as indistinctly punctulate below as above. Length, .05 to .08 inch. Described from 4 examples.

The pubescence is excessively fine, pruinose in appearance and lightly attached; when removed the surface seems highly polished, but with a good glass is seen to be densely punctulate. The smooth species of *Hemiptychus*, while readily separable by the eye, are not easily made known by description.

This species is next to *nigritulus*, the most common near Allegheny and Pittsburg. On *vaccinæ* and other low bushes; June, July; not abundant.

*Isomira ruficollis*.—Piceous black, thorax, mouth parts, tibiæ and tarsi ferrugineous. Head densely finely punctulate, transversely impressed between the antennæ, antennæ brown, one-third longer than head and thorax, in both sexes, third and fourth joints subequal, each not much longer than one of the following; thorax at extreme apex as wide as long, twice wider at base, very gradually narrowed from base to near apex and then suddenly incurved, margin exceedingly fine, base not or slightly sinuate each side of middle, hind angles slightly acute, dorsal line often scarcely evident, two or more vague discal impressions sometimes present, punctulation exceedingly fine and dense, dull from a dense microscopic pubescence; elytra at base scarcely wider than the thorax, slightly dilating to apical fourth, sutural stria not impressed before middle, 2nd not evident beyond apical 3rd and no traces of the others; closely, moderately, coarsely, uniformly punctuate over the whole surface, each puncture bearing a short inconspicuous hair, shining; underside punctulate like the upper, metasternum and side pieces more coarsely; length, .17–.21 inch. Described from eight examples.

Not rare on bushes near wet places. The elytra at full maturity are shining black, more or less brownish when immature. In some examples there is an undefined dark spot on the disk of the thorax. In this species, as well as in many other *Cistelides*, the antennæ differ much in length among individuals of either sex, also in the length of the joints; and the same is true in regard to the distance between the eyes; therefore, these characters are of little value for the separation of the species.

*Acalles curtus*.—Inflated, without erect setæ, unicoloured, cinereous. Head and beak, except at tip, finely granulato-punctate, punctures concealed by indument; thorax equally wide at apex and base where the width and length are subequal, one-fourth wider at middle, sides arcuately

rounded, disk notably depressed before the scutellum. Surface, when deprived of concealing indument, granular from the density of the punctuation, and with a polished dorsal line, elytra convex, inflated at middle, measured across the convexity as wide as long, roundly contracted from the middle to base where the width equals that of the thorax, posteriorly strongly declivous, deeply and widely striate, punctures large and distant, intervals convex and narrow with a crenate appearance; legs granulato-punctate and coated like the head and thorax. The punctures contain exceedingly short curved bristles visible only when sought for. Length, .08-.10 inch. Described from 4 examples. Easily known from all our species as yet described, by the absence of erect setæ and patches of scales on the elytra, as well as more globose form. Occurs near Allegheny, Pa., in April, about beech trees (*Fagus ferruginea*), under stones where it has hibernated, but is not often found.

*Pachybaris strigapunctus*.—Bariform, black, shining, tarsi piceous. Beak polished, slender, long, arcuate; that of ♂ punctate at base and finely irregularly lineate to apex when carefully viewed; that of ♀ scarcely longer, punctate and lineate at base to the insertion of the antennæ; first joint of antennæ nearly three times longer than second, which is one-half longer than third, 3 to 7 equal in length but increasing in thickness, the 7th rather suddenly; thorax wider than long, convergent from base forward, suddenly constricted at apex for the insertion of the head, base with a long scutellar-lobe on each side of which it is slightly sinuate, finely, closely strigate in longitudinal wavy lines, scatteringly punctured especially near the apex, a fine median line from apex to scutellum; elytra a little wider than the thorax, twice longer, widest at middle, finely striate, striæ not obviously punctured, intervals flat, uniseriately punctured, each puncture containing a white scarcely projecting hair or seta; underside, pro- and meso-thorax and legs rather coarsely closely punctured, venter more finely, white setæ of the punctures more conspicuous than above; tibiæ roughly striate and punctured. The ♂ has an acute tubercle before the anterior coxæ, in one example a spine as in some *Centrinus*; the anterior coxæ are not widely separated, the prosternal cavity is well marked but not incised. Length, .12 to .15 inch. Characterized from 3 ♂ and 3 ♀ examples. Occurs in May and June on *Cratagus*, but not abundantly.

*Balaninus confusor*.—Form, colour and vestiture the same as in *B. nasicus*. Rostrum in both sexes thickened and punctured at base, that of

the female not exceeding three-fourths the length of the body, and the antennal scape equaling the three basal joints. Hind femur with an oblique medium-sized tooth; claws with appendices acute. Length, .24 to .28 inch. Described from 5 ♂ and 5 ♀ examples. The foregoing characters will readily separate this species from any with which it is likely to be confused:—The oblique femoral tooth and acute claw appendix, from *B. nasicus* which it most resembles; the longer antennal scape of the ♀ and the beak thickened and punctured at base in both sexes, from *B. uniformis*; the acute claw appendices, denser vestiture and *nasicus* shape, from *obtusius*. Abundant in western and south-eastern Pennsylvania, West Virginia, south-eastern Ohio, Massachusetts, and North Carolina. Blanchard. For further comparative characters, see CAN. ENT., xxii., 7.

I have obtained this species from the acorns of *Quercus ilicifolia*, but it probably depredates on the fruit of other species of oak. An example was also obtained from one of the large apple-galls of *Solidago nemoralis*; these galls are composed of a compact porous mass caused by the larva of a fly named by Fitch *Acinia solidaginis* (Rep. 1st). The gall contained three coleopterous larvæ after the fly escaped, one of which developed the next year and turned out to be this species. Oviposition on this gall can scarcely have been otherwise than a mistake on the part of the parent.

### NOTES AND QUERIES.

BY REV. W. J. HOLLAND, PH. D., ALLEGHENY, PA.

I have just received a specimen of an *Erebus odora*, which was captured last Wednesday evening (Sept. 27th) in the lecture-room of the First United Presbyterian Church, in the city of Allegheny, where its appearance caused no little consternation among the devout "mothers in Israel" who were at prayer meeting, and who thought it was a bat, of which evil things are said by the unsophisticated. It is a male in good case. This is the third specimen I have received this summer. The first was taken about four weeks ago in the cellar of my father's residence in Bartholomew County, Indiana. The second was taken at Jeannette, Pa., near a spring-house. All three specimens are fresh in appearance, as if not long from the chrysalis. Undoubtedly this great moth is more than an occasional visitor from the tropics, and should be reckoned as belonging to our fauna, though scarce. Its capture has been recorded north of the Ohio and Potomac many scores of times, and it has been taken repeatedly in Canada.

*Papilio Cresphontes*, for the first time, has been taken this summer in the neighborhood of Pittsburgh, and in considerable numbers. One collector obtained four specimens in one locality. The food-plant is *Zanthoxylum* and *Ptelea* in these parts. In Florida its larva is abundant upon the orange and lemon trees.

One of the commonest of our *Papilios* is *Philenor*. Here its larva is found upon *Aristolochia*. In southern Indiana, in Bartholomew county, I have observed it summer after summer, sometimes in immense numbers. It is one of the commonest butterflies there, as here. But, with the exception of one or two specimens of *Aristolochia* growing about verandahs in the village of Hope, I think I may safely say there is not a plant of *Aristolochia* within many miles of the fields in which I have counted the perfect insects by the score. What is the other food-plant upon which the larva feeds? It runs in my mind that I have read that the caterpillar has been found upon the smart-weed (*Polygonum hydropiper*), but I cannot recall where I have seen this statement made. I have never been able to verify it by observation. Perhaps some reader of the CANADIAN ENTOMOLOGIST may be able to throw light upon the subject.

The banana merchants in our town have proved themselves possessed of curious entomological stores. I have received from them a couple of living tarantulas, and not long ago a living specimen of *Caligo Teucer*, which had emerged from a chrysalis hidden in a bunch of bananas. The insect had been transported by sea and land from either Honduras or some port in the northern portion of South America, a journey of several thousand miles. This reminds me that in several consignments of eastern *Lepidoptera* I have found our *Danais plexippus*, Linn. One of the sendings was from Borneo, the other from Java. We shall soon hear of its domestication on the mainland of Asia, and it will probably spread all over China and Japan. The insects taken by the U. S. Eclipse Expedition of 1889, at the Azores, numbered among them two specimens of this butterfly. There were only about a dozen specimens of insects taken at the Azores by the industrious? naturalists of the party, and I judge that it must be common there. Why we have not yet heard of its domiciliation on the African continent is a mystery to me. It will no doubt get there before long.

I have a specimen of *Limenitis* taken in Warren county, Pa., this summer, which is most remarkable. It has all the markings of *L. ursula*,

but both the primaries and secondaries are crossed by very broad, white bands, as in *L. arthemis*. It is, however, larger than any specimens of *Arthemis* I have ever seen, and exceeds the majority of *L. ursula* in size. It has the white spots in the cell of the primaries which appear in some female specimens of *L. Weidemeyeri*. It is altogether a queer beast combining the characteristics of three of our species. No doubt they all sprang from a common ancestry, and this specimen reveals the force of atavism.

### EXOCHILUM MUNDUM, SAY, ATTACKING THE FALL WEB-WORM.

BY A. H. KIRKLAND, ASSISTANT IN THE AMHERST, MASS., INSECTARY.

One hot afternoon in the early part of August, 1893, while out collecting, I found a large web of the Fall Web-Worm (*Hyphantria cunea*, Drury), on a young apple tree. Reaching up to cut off the twigs to which the web was attached, my attention was attracted by an unusual disturbance among the inmates of the web. Closer inspection revealed the fact that a medium-sized Ichneumon fly had intruded within the family circle, and was proving herself a most unwelcome visitor. Tearing into the web with her feet she would force her way along until she arrived under the skeletonized leaves upon which the larvæ were resting and through which they were plainly visible. When her presence was noticed by the larvæ lying on a large leaf nearest the intruder, they raised their heads and swung them rapidly from side to side, and at the same time each one emitted a drop of greenish fluid from its mouth. Meanwhile the Ichneumonid had crept up under the leaf, and bending the posterior segments of her abdomen until the partly exerted ovipositor extended forward between the feet and beyond the head, she poised herself for a moment as if to take aim, then with lightning rapidity she darted her abdomen and ovipositor still farther forward and struck through the leaf into the body of a larva, which at once commenced to writhe and twist as if in great pain. I watched this operation continue for about half an hour and did not observe the Ichneumonid sting any larva more than three or four times, usually but once.

Upon attempting its capture it broke out of the web and flew off. Soon, however, it returned, and after circling about for a short time as if to select a favorable place for renewing operations, it alighted and again forced an entrance into the web. This time my efforts were successful, and my capture, as kindly determined by Prof. Fernald, proved to be *Exochilum mundum*, Say. The larvæ that had been stung were brought to the Insectary for the purpose of obtaining more specimens of this interesting Ichneumonid.

## NORTH AMERICAN THYSANURA—IV.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Most modern European writers follow Tullberg in placing all the Collembola in the family *Poduridæ*, and including the *Poduridæ*, *Lipuridæ* and *Anouridæ* of Lubbock in the subfamily *Lipurinæ*. It would seem more natural to restrict the name *Poduridæ* to those genera bearing the saltatory apparatus on the antepenultimate abdominal segment, instead of the penultimate, and then to include those genera in which the saltatorial apparatus is wanting under the name *Aphoruridæ*.\*

## APHORURIDÆ, nom. nov.

Body naked, generally small; antennæ four-jointed; ocelli present or absent; postantennal organ usually present; tarsi with one or two claws; furcula wanting.

The genera belonging to this family can be readily separated by means of the following table:—

- A. Mouth parts not produced cone-like beneath the head.
  - B. Tarsi with two distinct claws..... *Aphorura*.
  - BB. Tarsi with a single stout claw.
    - C. Postantennal organ wanting..... *Bourletia*.
    - CC. Postantennal organ present.
      - D. Anal spines present; postantennal organ transverse..... *Tullbergia*.
      - DD. Anal spines wanting; postantennal organ circular..... *Anurida*.
- AA. Mouth parts produced cone-like beneath the head.
  - B. Ocelli present, three on each side of the head..... *Neanura*.
  - BB. Ocelli wanting..... *Aphoromma*.

*Aphorura*, † gen. nov.—Ocelli wanting; antennæ four-jointed; postantennal organ present; ocellate punctures at base of the antennæ present; lower claw of tarsi distinct. Type, *Podura ambulans*, Linn.

Proposed for *Lipura*, Burm., which is preoccupied in Mammology.

*Bourletia*, gen. nov.—Ocelli sixteen, eight on each side of the head; antennæ four-jointed; ocellate punctures, postantennal organ, anal spines and lower tarsal claw wanting. Type, *Anurophorus laricis*, Nic.

\* *Lipura* and *Anura* are both preoccupied in zoology.

† α, priv.; φορός, ferens; οὐρά, cauda.



Tullberg uses *Anurophorus*, Nic., for this species, but both *Anurophorus* and *Adicranus*, Bourl., have *Podura fimetaria*, Linn., as type, which belongs to *Lipura*, Burm. The genus is named for the Abbe Bourlet, a well-known writer on Thysanura.

*Tullbergia*, Lubbock.—Ocelli wanting; antennæ four-jointed; postantennal organ present; lower claw of tarsi wanting; anal spines large, stout; body elongate. Type, *Tullbergia antarctica*, Lub.

*Anurida*, Laboulb.—Ocelli ten, five on each side of the head; antennæ four-jointed; postantennal organ present; ocellate punctures, lower claw of tarsi, and anal spines wanting. Type, *Achorutes maritimus*, Guer.

*Anurida maritima*, Guer.—Body plumbeous, sparsely covered with long hairs; head triangular, produced between the antennæ, broadly truncate in front, broadly emarginate behind; antennæ shorter than the head, basal segment large, globular, one-half broader than the other segments, second segment a little longer than the first, the third and fourth closely joined, as long as the first and second together; eyes five, two in front and three behind; postantennal organ with seven prominences, arranged in the form of a circle; legs short and stout, covered with long stiff bristles; claws long, blunt, one-half the length of the tibia. Length, 3 mm.

Habitat: Eastern coast of the United States, Europe.

*Neanura*, gen. nov.—Ocelli six, three on each side of the head; antennæ four-jointed; postantennal organ present or wanting; ocellate punctures, anal spines, and lower claw of tarsi wanting; mouth parts produced cone-like beneath the head. Type, *Achorutes muscorum*, Temp.

Proposed for *Anoura*, Gerv., which is preoccupied in Mammology.

*Aphoromma*, ‡ gen. nov.—Ocelli wanting; antennæ four-jointed; postantennal organ present; ocellate punctures, anal spines, and lower claw of tarsi wanting; mouth parts produced cone-like beneath the head. Type, *Anoura granaria*, Nic.

#### PODURIDÆ.

Body cylindrical, naked, usually small; antennæ four or five-jointed; eyes present, with ten to thirty ocelli; postantennal organs usually wanting; tarsi with one or two claws; furcula present, attached to the fourth abdominal segment.

‡α, priv.; φορός, ferens; ὄμμα, oculus.

The genera belonging to this family, as restricted above, can be separated as follows :—

- A. Mouth parts not produced cone-like in front of the head.
  - B. Antennæ four-jointed.
    - C. Tarsi with two claws.
      - D. Abdomen without anal spines.....*Achorutes*.
      - DD. Abdomen with anal spines.
        - E. Abdomen with two anal spines.....*Schoturus*.
        - EE. Abdomen with four anal spines...*Tetracanthella*.
    - CC. Tarsi with a single claw.
      - D. Ocelli twenty-eight or thirty, fourteen or fifteen on each side of the head ; anal spines wanting.....*Podurhippus*.
      - DD. Ocelli less than twenty-eight.
        - E. Anal spines wanting.
          - F. Furcula long, reaching beyond the apex of the abdomen, arcuate.....*Podura*.
          - FF. Furcula short, never extending beyond the apex of the abdomen, not arcuate.
            - G. Legs long, distinctly visible from above.....*Pseudachorutes*.
            - GG. Legs extremely short, not visible from above:.....*Brachysius*.
        - EE. Anal spines present.
          - F. With two anal spines.....*Xenylla*.
          - FF. With more than two anal spines.
            - G. With three anal spines.....*Triena*.
            - GG. With four anal spines.....*Oudemansia*.
      - BB. Antennæ five-jointed.....*Lubbockia*.
    - AA. Mouth parts produced cone-like in front of the head.*Gnathocephalus*.

*Achorutes*, Temp.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ short, four-jointed ; body cylindrical, segments sub-equal ; tarsi with two claws ; anal spines wanting. Type, *Achorutes dubius*, Temp.

*Achorutes longispinus*, sp. nov.—Body cylindrical, purplish-black, hairy ; head large, rounded in front, truncate behind, prolonged between the antennæ, acutely triangular ; eyes on a small black patch almost directly behind the antennæ in the middle of each lateral half of the head ; antennæ about as long as the head, basal joint globular, minute, incon-

spicuous, set in an excavation beneath the frontal projection, second and third joints subequal, globular, fourth joint elongate, as long or longer than the three basal joints, cylindrical, pointed, the inner side at apex appearing truncated; legs stout; claws large, inner claw more than half the length of outer, outer with a denticle at base; furcula elongate, reaching the hind pair of legs; manubrium large, reaching beyond the apex of the abdomen, sides straight, sub-parallel; dentes elongate, as long as the manubrium, broadest at middle, underside with two or three rows of stiff spines; mucrones short, not longer than broad, with an apical and a preapical tooth. Length, 1-1.25 mm.

Habitat: Alameda, near Las Cruces, New Mexico.

Received from Mr. Theo. D. A. Cockerell, who had received them from Mr. E. VanPatten, "who found them in immense numbers at Alameda."

*Schoturus*,|| gen. nov.—Ocelli sixteen, eight on each side of the head; postantennal organ wanting; antennæ short, four jointed; body cylindrical, segments sub-equal; tarsi with two claws; anal spines present, two. Type, *Podura nivicola*, Fitch.

This genus is proposed for those species at present placed in the genus *Achorutes* and which have anal spines.

*Tetracanthella*, Schott.—Ocelli sixteen, eight on each side of the head; postantennal organ present; antennæ four-jointed; tarsi with two claws; anal spines present, four, arranged in two rows; furcula short. Type, *Tetracanthella pilosa*, Schott.

Entom., Tidsk., XII., 1891, 191; fig.

*Podurhippus*, Megnin.—Ocelli twenty-eight or thirty, fourteen or fifteen on each side of the head; antennæ four-jointed; tarsi with a single claw; furcula short, slender; ventral tube tuberculate, bilobed. Type, *Podurhippus pityriasious*, Megnin.

Bull. Soc. Ent. Fr. (5), VIII., 1878, p. cxxxv.; Les Parasites, 1880, p. 104; fig. 42.

*Podura* Linn.—Ocelli sixteen, eight on each side of the head; post-antennal organ wanting; antennæ four-jointed; tarsi with a single claw; furcula long, slender, arcuate; anal spines wanting. Type, *Podura aquatica*, Linn.

*Podura granulata*, sp. nov.—Body, legs and antennæ bluish-black;

|| σφόδρος, obscurus; οὐρά, cauda.

antennæ long and slender, longer than the head ; head with a quadrangular tubercle between the eyes ; thorax slender, much narrower than the head ; legs short and stout ; claws long and slender, as long as the tibia and tarsus together ; tenant hair present ; furcula long and slender, reaching the first pair of legs, densely covered with closely placed, blunt, spiny tubercles, the tubercles arranged in transverse rows around the spring, giving the spring a striated appearance with a low objective ; manubrium short and stout, apex produced between the dentes broadly triangular ; dentes long, slender, a few scattered hairs, and indications of a transverse suture at middle ; mucrones short, pointed, with a triangular tooth at base. Length, 1.25 mm.

Habitat : Tennessee.

Collected in great numbers by Prof. H. E. Summers from the surface of thin, slimy mud.

*Pseudachorutes*, Tullb.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ conical, four-jointed ; tarsi with a single claw ; furcula short, reaching the apex of the abdomen ; anal spines wanting. Type, *Pseudachorutes subcrassus*, Tullb.

*Brachysius*, § nov. gen.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ short, not longer than the head is broad, four-jointed ; tarsi with a single claw ; furcula short, not reaching the apex of the abdomen nor the ventral tube ; anal spines wanting ; legs short and stout, not reaching the side of the body. Type, *Brachysius dilatatus*, sp. nov.

*Brachysius dilatatus*, sp. nov.—Bluish mottled with gray ; antennæ short, not much longer than the head, first joint very small, second and third subequal, fourth almost as long as second and third together ; body long and slender, broader towards the caudal end ; legs short and slender, not extending beyond the side of the body ; furcula short and slender ; anal papillæ small, not divided, covered with stiff bristles. Length, 2 mm.

Habitat : Ithaca, N. Y.

This species has the habitus of those of the genus *Neanura*, but can be readily distinguished by the number of ocelli and by the presence of the furcula.

*Xenylla*, Tullb.—Ocelli ten, five on each side of the head ; postantennal organ wanting ; antennæ four-jointed ; body cylindrical ; tarsi with a single claw ; anal spines present, two. Type, *Xenylla maritima*, Tullb.

§βραχύς, brevis ; ἰσσοός, jaculum.

*Triana*, Tullb.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ four-jointed, conical ; tarsi with a single claw ; furcula extremely small, papilliform ; anal spines present, three. Type, *Triana mirabilis*, Tullb.

*Oudemansia*, Schott.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ short, four-jointed ; body cylindrical, segments subequal ; tarsi with two claws ; anal spines present, four, arranged in a circle around the apex of the abdomen ; furcula not attaining the ventral tube. Type, *Oudemansia cærulea*, Schott.

Entom. Tids., XIV., 1893, 174 ; pl., II., 1-7.

*Lubbockia*, Haller.—Antennæ five-jointed, longer than the body ; all the tarsi with tenant hairs, small on the front and middle pairs ; anal spines present, two ; furcula small ; body cylindrical, segments subequal. Type, *Lubbockia cærulea*, Haller.

Mittheil. Schweiz. Entom. Ges., VI., 1880, 4.

*Gnathocephalus*,\* gen. nov.—Ocelli sixteen, eight on each side of the head ; postantennal organ wanting ; antennæ short, conical, four-jointed ; body cylindrical ; tarsi with a single claw ; anal spines wanting ; furcula short, not attaining the ventral tube ; mouth-parts folded together in the form of a tube and projecting in front of the head. *Gnathocephalus complexus*, sp. nov.

*Gnathocephalus complexus*, sp. nov.—Body robust, broadest behind, bluish-black, a row of paler spots down each side, and a few scattered hairs on the caudal end ; head small, triangular, strongly produced between the antennæ, broadly truncate in front ; eye spot small, on a raised tubercle ; antennæ slightly longer than the head, basal segment a little longer than broad, broadest at middle, second segment as broad as the first and slightly shorter ; third and fourth segments sub-equal, longer than the first and second, and much narrower, the suture between them not distinctly indicated ; legs long and slender, with lighter markings and scattered regularly placed bristles ; tenant hairs wanting ; claws stout ; furcula short, stout ; manubrium half as broad as the abdomen, nearly as broad as long, slightly incised between the dentes ; dentes two-thirds the length of the manubrium, cylindrical, narrowed at apex ; mucrones one-half the length of the dentes, slightly arcuate, without teeth. Length, 3-4 mm.

Habitat : Olympia, Washington. (Trevor Kincaid, collector.)

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\*Γνάθος, maxilla ; Κέφαλος, caput.

## ON THE EUDRIINÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In an original memoir on the *Zygaenidæ*, published by the Essex Institute, Dr. Packard explained the relation of *Castnia* and allied genera to the European genus *Zygaena*, and contended for the solidarity of the group as the equivalent of the large family of *Bombycidæ* in the Latreillean sense. The view, advocated by Agassiz, that *form* was a family criterion, not only form in general, but form of parts underlying form in general, obtained. Of a truth Dr. Packard's "family," *Zygaenidæ*, contained genera more or less evidently related in one or other of their stages, and the agreement which Dr. Packard found in the form of the clypeus authorized their being brought together in a family group. This view has been followed by me in my papers and lists, and any adverse criticism of my particular course with regard to these insects is consequently ill-founded; while the inherent want of precision which our classifications must present allows of a shifting opinion, within limits, as this or that character appears in turn to be the decisive one, and renders such criticism unnecessary. The tendency of classifiers latterly has turned in the direction of a breaking up of these "families" into smaller groups still called "families," but based rather upon ultimate peculiarity than "form." Under the vague term "Bombyces," the various new families of the Spinner moths are still kept together, in recognition of a less tangible relationship which nevertheless is still held to exist; while the view, that the present representation of these families is the modified survival of the roots of the lepidopterous tree, is being seriously considered by students of phylogeny. Classifiers of the lepidoptera who seize only upon ultimate peculiarities of a common and essential part of the perfect insect, will, in the nature of things, eventually come to grief. Such modifications we may use to separate species, and, when so evident as to be of practical service, in the more artificial region of generic division; but, as we ascend higher, they diminish in importance and are superseded by characters of development, persistent or evanescent, offered in different stages of growth of the species. By these characters indications as to the truer affinities of the insect are given. The time is perhaps going by when lepidoptera are to be solely classified by final peculiarities of the legs, wings or tails of the perfect insect. Still, there will always be those whose observations in these directions will seem to themselves of prime importance, while, in the end, the value

of their observations will be differently expressed in our classifications. The family "*Zygaenida*" has shared the fate of disintegration with the family "*Bombycidae*." Dr. Packard now recognizes three family groups : *Agaristida*, *Castniida* and *Zygaenida*. The sub-family *Eudriina*, as I would consider it, the subject of the present notice, belongs, with the sub-family *Alypiina*, to the *Agaristida*. The present sub-family seems to be exclusively American ; at least I have met in literature with but one extra limital form, the African genus *Ovios*, which may possibly belong here. The general form of the perfect insect recalls that of the *Noctuida*, so that Hübner considers it one, while Boisduval proposes the genus *Eudryas* for the typical generic group and apparently recognizes structural affinities to *Castnia*. The larva, as we now know, is closely related to that of *Alypia*. The genera of the *Eudriina* may be briefly distinguished as follows :—

- |                                        |                               |
|----------------------------------------|-------------------------------|
| 1. Structure of the male wings normal, | 2.                            |
| Structure of the male wings abnormal.  | <i>Euscirrhopterus</i> , Grt. |
| 2. Male antennæ simple, 3.             |                               |
| Male antennæ pectinate.                | <i>Ciris</i> , Grt.           |
| 3. Front smooth.                       | <i>Eudryas</i> , Boisd.       |
| Front horned.                          | <i>Copidryas</i> , Grt.       |

With regard to the geographical distribution *Eudryas* occurs in North America (east and west coast), and in South America (Paraguay). *Copidryas* in North America (New Mexico, Texas) and in South America.\* (? Buenos Ayres). *Euscirrhopterus* is Cuban and *Ciris* is from Texas. With regard to the species, it is not entirely impossible that Walker's type of *Eudryas* *Stæ. Johannis* represents a Florida species else unknown. It is pronounced by Prof. Smith to be an aberration of *E. grata*, and its divergence from the type to have been probably produced by the "vicissitudes of the voyage." The former statement may not improbably be the true solution of the matter, since so prominent an insect should have been turned up by collectors in Florida ere this, one might think. But the cause assigned for such an aberration I am unable to follow, or even to understand. What is meant by "vicissitudes of the voyage?" The pupa (?) could not have suffered shipwreck or been washed ashore! What records are there in literature of extraordinary variations being produced through ordinary transportation by sea? The chances against the

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See Papilio 3, 106. Berg's *Platensis*, as I understand his remark as to the front, probably belongs to *Copidryas*.

unprotected survival during the voyage, that this pupa should produce an unique variety, the capture of the perfect moth on a Church step in England, its delivery at the British Museum, taken altogether seem enormous. The fact that the hind-wings are unbanded is paralleled in the case of a new species from South America, which I describe here. According to Mr. Tutt's kind communication : There is a place in Southwark, one of the London districts close by London Bridge, called "Horselydown," and there is a church there called St. John's. As this is very near the river an imported insect might be found there if we suppose it to escape from the shipping on the Thames. But there is also a place called "Horsley" in Surrey, and there are some well-known "Downs" there which have been entomologically worked over from a long period. But there is no St. John's Church there, and under the theory that Walker named the insect from the Church in England, and not, as I had imagined possible, from the St. John's River, Florida, where Doubleday collected, the Surrey locality must be abandoned. We are, therefore, driven to the conclusion that if the label is genuine, the specimen was really captured at "Horselydown," and that "Horsley Downs" is a mistake for the former on the label. If a normal specimen of *Eudryas grata* had been stated to have been caught in England, while still extraordinary, there would have been nothing so very improbable in the fact, since, according to Wood and other English authors, *Drasteria*, *Eustrotia* and other American moths have been so taken (?); I myself took a specimen of a South American species of Noctuidæ on the Battery in New York. But that this particular specimen should belong also to a very remarkable variety, never observed in America, increases the chances against the story (which may nevertheless be a true one) enormously. *Eudryas*, we may concede, might stand the voyage as a pupa and also escape as a moth in London, but how a *Stæ. Johannis* could have been turned out of a *grata* caterpillar or pupa owing to the "vicissitudes of the voyage" I do not comprehend. The type which I saw in 1868 differed not only from *grata* in its unbanded secondaries, but also by its differently coloured and perhaps marked primaries. While I recognized it as allied to *grata*, I could not help supposing it a distinct species, since I had never known *grata* to vary in that manner. In fact, that it might be a variety did not, I think, occur to me. I did not visit the Museum for the express purpose of studying *Stæ. Johannis*. I took it in rapidly and saw that it was an *Eudryas* and differed from both our common species, *grata* and *unio*, and simply re-



corded the fact that it impressed me as a distinct and even larger species. It may be that we are already in possession of the final solution of this little entomological mystery, and that *Stæ. Johannis* is really an extraordinary variation of *grata*, captured on the Church door of St. John's, in Horselydown, London, England. But it will nevertheless remain an interesting subject until we find specimens in America of the aberration, which ought to occur there also, or until we send *grata* pupa across the Atlantic and observe the effects of the "vicissitudes of the voyage." If any of these latter evolve as *Stæ. Johannis*, the mystery would be solved, and an important phase in the general subject of variation opened up. But I cannot think it. The aberration, if one, must have a cause independent of the mere voyage. Moisture, temperature, might possibly darken the primaries, but how are we to account for the secondaries, which so far from being "suffused," have no band at all, the usual ground colour obtaining over the whole surface? Here is a specimen which on the fore-wings is to show the effects of melanism, and on the hind-wings of albinism. The type of *Stæ. Johannis* is, under the circumstances, one of the most extraordinary specimens, I think, in the British Museum collection, whatever view we take of the matter, and the question before the American collector now is the range of variability in *E. grata*, and whether this shows any steps in the direction of a darkening of the fore-wings and obliteration of the marginal band on secondaries. Thus, quite independent of mere controversy as to the origin of the type, the subject is eminently one for scientific enquiry and experiment.

*Eudryas Cypris*, n. s.

The hind-wings with the fringes are pale vermillion-red above and below, immaculate, without band or markings. Fore-wings beneath of the same red, immaculate. Above the fore-wings have the main central portion creamy, not pure white as in allies, shading inferiorly to ochrey-olivaceous, and there is an olivaceous shade patch over the median nervules edged outwardly narrowly with whitish and deepening in colour inferiorly. A brownish terminal band, best marked superiorly on costa, and showing a lilac reflection. From opposite the cell to anal angle this band is indented by the pale red terminal edge of the wing. The somewhat olivaceous fringes show a darker median line. The costal edge towards apices is faintly red. The costal and internal shading recalls *grata*, but there is less trace of the reniform than in the N. American form; in *cypris* the traces of the reniform (perhaps variable) are fragment-

ary, as in *unio*. Abdomen red on the sides; venter pale. Antennæ simple. Front not tuberculate. One female from Assumption (So. America, coll. Consul Mangels) in Mus. Bremen.

This species is perhaps a little smaller than *grata*, very different from both N. American species by the darker creamy shade, not white, of the median field of primaries, by the red colour of hind-wings and under-surface, by the red abdomen and unbanded secondaries. It is, in shape of primaries and in their style of ornamentation, nearer *grata* than *unio*. The discovery of a South American representative of *grata*, with unbanded secondaries, is interesting. The latter character is only found in *E. Stae. Johannis*, where the yellow hind-wings are without band. Although on this account alone the specific value of the latter may not be adequately defended, yet the probabilities in favour of this view may be considered to become somewhat heightened in view of the discovery of the South American species. The terminal bands of the hind-wings in *grata* and *unio* are decidedly characteristic, and one is unprepared for their absence in *Stae. Johannis*, unwilling to consider so marked a modification merely varietal.

The following is a list of the *Eudriinæ*:—\*\*

- |                                                 |                                        |
|-------------------------------------------------|----------------------------------------|
| <i>Eudryas</i> , Boisd.                         | <i>Copidryas</i> , Grt.                |
| 1. <i>unio</i> , <i>Hübner</i> .                | 5. <i>Gloveri</i> , <i>G. &amp; R.</i> |
| <i>var. brevipennis</i> , <i>Stretch</i> .      | 6. <i>platensis</i> , <i>Berg.</i>     |
| 2. <i>grata</i> , <i>Fabr.</i>                  |                                        |
| <i>assimilis</i> , Boisd.                       |                                        |
| <i>ab?</i> <i>Stræ. Johannis</i> , <i>Walk.</i> | <i>Euscirrhopterus</i> , Grt.          |
| 3. <i>Cypris</i> , <i>Grt.</i>                  | 7. <i>Poeyi</i> , <i>Grt.</i>          |
| <i>Ciris</i> , <i>Grt.</i>                      | <i>disparilis</i> , <i>H.-S.</i>       |
| 4. <i>Wilsoni</i> , <i>Grt.</i>                 |                                        |

The North American *Agaristidæ* apparently fall into two sub-families, the *Eudriinæ*, above catalogued, and the *Alypiinæ*, containing *Alypia*, *Androloma*, *Pseudalypia*, *Edwardsia*, and *Psychomorpha*. The *Castnidiæ* are apparently not represented in the North American fauna. The *Zyganidæ* are now restricted by Dr. Packard so as to include *Horama*, *Burtia* and allies, with *Ctenucha* and *Scepsis* in one sub-family group, while *Procris*, *Harrisina* and their allies fall into the typical sub-family, being more intimately related with the European *Zygæna*, a genus not represented with us. From this it will appear that a belief in the stability of the rearrangement of the *Zyganidæ* in the Philadelphia List will probably prove illusory. The genus *Oeta*, *Grt.*, should be removed to the *Tineidæ*, as indicated by Zeller.

\*\*For a list of our species consult also Papilio I., 177. I have never seen a Californian specimen, and am quite doubtful as to *brevipennis* being a variety of *unio*. *Stretch's* figure and description were made from an imperfect example. The Cuban *E. Poeyi* was subsequently described by Herrick-Schaeffer as *Heterandra disparilis*; on comparison of the dates of issue of the two publications, which appeared nearly at the same time, the Philadelphia paper has priority.

## LIST OF COLEOPTERA TAKEN AT SPARROW LAKE, ONT.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

[In our last number, pages 272-5, the lists of Coleoptera were unfortunately disarranged in making up the forms. We accordingly reprint them in their proper order.—ED. C. E.]

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| Cicindela repanda, <i>Dej.</i>     | Platynus melanarius, <i>Dej.</i>      |
| var. 12-guttata, <i>Dej.</i>       | corvus, <i>Lec.</i>                   |
| Cychrus Lecontei, <i>Dej.</i>      | placidus, <i>Say.</i>                 |
| Carabus sylvosus, <i>Say.</i>      | Bogemanni, <i>Gyll.</i>               |
| Calosoma scrutator, <i>Fab.</i>    | ruficornis, <i>Lec.</i>               |
| Wilcoxi, <i>Lec.</i>               | Galerita janus, <i>Fab.</i>           |
| calidum, <i>Fab.</i>               | Lebia viridis, <i>Say.</i>            |
| Elaphrus ruscarius, <i>Say.</i>    | Metabletus americanus, <i>Dej.</i>    |
| Loricera cærulescens, <i>Linn.</i> | Cymindis pilosa, <i>Say.</i>          |
| Nebria pallipes, <i>Say.</i>       | Brachynus cyanipennis, <i>Say.</i>    |
| Scarites subterraneus, <i>Fab.</i> | Chlænïus sericeus, <i>Forst.</i>      |
| Dyschirius nigripes, <i>Lec.</i>   | pennsylvanicus, <i>Say.</i>           |
| Bembidium patrule, <i>Dej.</i>     | Anomoglossus emarginatus, <i>Say.</i> |
| versicolor, <i>Lec.</i>            | Brachylobus lithophilus, <i>Say.</i>  |
| Sp. undetermined.                  | Agonoderus pallipes, <i>Fab.</i>      |
| Tachys nanus, <i>Gyll.</i>         | Harpalus erraticus, <i>Say.</i>       |
| flavicauda, <i>Say.</i>            | viridiæneus, <i>Beauv.</i>            |
| Patrobus longicornis, <i>Say.</i>  | Sp. undetermined.                     |
| Pterostichus honestus, <i>Say.</i> | pennsylvanicus, <i>De G.</i>          |
| coracinus, <i>Newm.</i>            | fallax, <i>Lec.</i>                   |
| stygius, <i>Say.</i>               | pleuriticus, <i>Kirby.</i>            |
| lucublandus, <i>Say.</i>           | viduus, <i>Lec.</i>                   |
| caudicalis, <i>Say.</i>            | Stenolophus plebei, <i>Dej.</i>       |
| luctuosus, <i>Dej.</i>             | conjunctus, <i>Say.</i>               |
| corvinus, <i>Dej.</i>              | Anisodactylus Harrisii, <i>Lec.</i>   |
| erythropus, <i>Dej.</i>            | interstitialis, <i>Say.</i>           |
| Amara exarata, <i>Dej.</i>         | Ilybius biguttatus, <i>Germ.</i>      |
| pallipes, <i>Kirby.</i>            | Hydaticus stagnalis, <i>Fab.</i>      |
| rubrica, <i>Hald.</i>              | Dytiscus fasciventris, <i>Say.</i>    |
| Calathus gregarius, <i>Say.</i>    | Gyrinus canadensis, <i>Reg.?</i>      |
| Platynus sinuatus, <i>Dej.</i>     | analís, <i>Say.</i>                   |
| extensicollis, <i>Say.</i>         | Berosus striatus, <i>Say.</i>         |
| atratus, <i>Lec.</i>               | Philydrus perplexus, <i>Lec.</i>      |

- Hydrobius fuscipes*, Linn.  
*Creniphilus sub-cupreus*, Say.  
*Cercyon pygmæum*, Ill.  
*Necrophorus vespilloides*, Hbst.  
*Silpha Americana*, Linn.  
*Liodes discolor*, Mels.  
*Homalota trimaculata*, Er.  
*Bolitochara picta*, Fauv.  
*Aleochara bimaculata*, Grav.  
     *graciliformis*, Fauv.  
*Gyrophæna vinula*, Er.  
*Quedius fulgidus*, Fab.  
     *lævigatus*, Gyll.  
*Listrotrophus cingulatus*, Grav.  
*Creophilus maxillosus*, Linn.  
*Staphylinus violaceus*, Grav.  
*Philonthus politus*, Linn.  
     *longicornis*, Steph.  
     *micans*, Grav.  
     *cyanipennis*, Fab.  
     *sordidus*, Grav.  
     Sp. undetermined.  
*Xantholinus obsidianus*, Mels.  
     *emmesus*, Grav.  
     *obscurus*, Er.  
     N. S. (found here).  
*Baptolinus longiceps*, Fauv.  
*Stenus*—3 sp.  
*Lathrobium punctulatum*, Lec.  
     *bicolor*, Lec.  
*Stilicus*, sp.  
*Pæderus littorarius*, Grav.  
*Sunius longiusculus*, Mann.  
*Tachinus repandus*, Horn.  
     *fimbriatus*, Grav.  
*Erchomus ventriculus*, Say.  
*Conosoma pubescens*, Payk.  
*Boletobius cincticollis*, Say.
- Olisthærus substriatus*, Gyll.  
*Oxyporus femoralis*, Grav.  
     *rufipennis*, Lec.  
*Oxytelus sculptus*, Grav.  
     *pennsylvanicus*, Er.  
     *insignitus*, Grav.  
*Trogophlæus 4-punctatus*, Say.  
*Scaphisoma convexum*, Say.  
*Hippodamia 13-punctata*, Linn.  
*Coccinella trifasciata*, Linn.  
*Chilocorus bivulnerus*, Muls.  
*Psyllobora 20-maculata*, Say.  
*Hyperaspis signata*, Oliv.  
*Scymnus lacustris*, Lec.  
*Endomychus biguttatus*, Say.  
*Tritoma thoracica*, Say.  
*Silvanus bidentatus*, Fab.  
*Læmophlæus fasciatus*, Mels.  
*Hister depurator*, Say.  
     *sedecimstriatus*, Say.  
     *carolinus*, Payk.  
     *Lecontei*, Mars.  
*Epuræa Erichsonii*, Reit.  
     Sp.  
*Ips fasciatus*, Oliv.  
*Stephostethus liratus*, Lec.  
*Corticaria pusilla*, Mann.  
     *pumila*, Lec.  
*Tenebrioides corticalis*, Mels.  
*Cyphon obscurus*, Guer.  
*Deltometopus amenicornis*, Say.  
*Dromaeolus Harringtoni*, Horn.  
*Alaus myops*, Fab.  
*Agriotes fucosus*, Lec.  
     Sp.  
*Melanotus castanipes*, Payk.  
     *fissilis*, Say.  
*Corymbites medianus*, Germ.

- Cormybitis propola, *Lec.*  
 Dicerca tuberculata, *Chev.*  
     *Sp. undetermined.*  
 Buprestis rusticorum, *Kirby.*  
     *fasciata, Fab.*  
 Agrilus ruficollis, *Fab.*  
 Calopteron terminale, *Say.*  
 Calochromus perfaceta, *Say.*  
 Ellychnia corusca, *Linn.*  
 Telephorus lineola, *Fab.*  
     *scitulus, Say.*  
 Collops tricolor, *Say.*  
 Trichodes Nuttalli, *Kirby.*  
 Hydnocera pallipennis, *Say.*  
     *longicollis, Zieg.*  
 Cis fuscipes, *Mellie.*  
 Canthon lævis, *Drury.*  
 Onthophagus Hecate, *Panz.*  
 Dialytes striatulus, *Say.*  
     *Ulkei, Horn.*  
 Aphodius fossor, *Linn.*  
     *fimetarius, Linn.*  
     *ruricola, Mels.*  
     *leopardus, Horn.*  
     *lentus, Horn.*  
 Geotrupes splendidus, *Fab.*  
 Anomala lucicola, *Fab.*  
 Ligyris relictus, *Say.*  
 Euphoria fulgida, *Fab.*  
 Osmoderma scabra, *Beauv.*  
 Trichius affinis, *Gory.*  
 Valgus canaliculatus, *Fab.*  
 Hylotrupes bajulus, *Linn.*  
     *ligneus, Fab.*  
 Calloides nobilis, *Say.*  
 Arhopalus fulminans, *Fab.*  
 Xylotrechus sagittatus, *Germ.*  
 Clytanthus ruricola, *Oliv.*  
 Eudercus picipes, *Fab.*  
 Desmocerus palliatus, *Forst.*  
 Centrodera decolorata, *Harr.*  
 Gaurotes cyanipennis, *Say.*  
 Typocerus sparsus, *Lec.*  
     *velutinus, Oliv.*  
 Leptura nitens, *Forst.*  
     *canadensis, Oliv.*  
     *vagens (var. brevis, Kirby)*  
 Monohammus confusor, *Kirby.*  
 Urographis fasciatus, *De G.*  
 Saperda vestita, *Say.*  
     *3-dentata, Oliv.*  
 Amphionycha flammata, *Newm.*  
 Donacia palmata, *Oliv.*  
     *piscatrix, Lac.*  
     *proxima, Kirby.*  
     *2 sp. not determined.*  
 Pachybrachys femoratus, *Oliv.*  
     *hepaticus, Mels.*  
 Monachus saponatus, *Fab.*  
 Diachus auratus, *Fab.*  
 Adoxus obscurus (var. vitis, *Fab.*)  
 Xanthonia 10-notata, *Say.*  
 Typophorus canellus (var. aterri-  
     *mus.)*  
 Chrysochus auratus, *Fab.*  
 Rhabdopterus picipes, *Oliv.*  
 Doryphora 10 lineata, *Say.*  
 Chrysomela bigsbyana, *Kirby.*  
 Galerucella nymphææ, *Linn.*  
 Diabrotica 1 2-punctata, *Fab.*  
     *" vittata, Fab.*  
 Phyllobrotica decorata, *Say.*  
 Cerotoma 3-furcata, *Forst.*  
 Dysonycha pennsylvanica, *Illig.*  
 Haltica ignita, *Illig.*  
 Crepidodera helxines, *Linn.*

*Epitrix cucumeris*, *Harris*.

*Systena hudsonias*, *Forst.*  
*marginalis*, *Illig.*

*Nyctobates pennsylvanica*, *De G.*

*Xylopinus saperdioides*, *Oliv.*

*Tenebrio molitor*, *Linn.*

*Blapstinus interruptus*, *Say.*

*Uloma impressa*, *Mels.*

*Diaperis hydni*, *Fab.*

*Bolethotherus bifurcus*, *Fab.*

*Cistela sericea*, *Say.*

*Penthe pimelia*, *Fab.*

*Eustrophus confinis*, *Lec.*

*Canifa pallipes*, *Mels.*

*Stenotrachelus arctatus*, *Say.*

*Anaspis rufa*, *Say.*

*Mordella melæna*, *Germ.*  
*marginata*, *Mels.*

*Xylophilus tuberculifer*, (*infra.*)

*Epicauta pennsylvanica*, *De G.*

*Attelabus bipustulatus*, *Fab.*

*Ithycerus noveboracensis*, *Forst.*

*Lissorhoptrus simplex*, *Say.*

*Magdalis armicollis*, *Say.*

*Orchestes niger*, *Horn.*

*Gymnetron tetrum*, *Fab.*

*Balaninus uniformis*, *Lec.*

*Eupsalis minuta*, *Drury.*

*Dryocetes*, n. sp.

## CORRESPONDENCE.

### NOTES ON HEPIALUS.

IN CAN. ENT., Vol. XXV., p. 124, Mr. Neumoegen and myself referred *Hepialus quadriguttatus* as a synonym of *H. argenteomaculatus*, and described the salmon-colored form as a new variety. To this Mr. Grote objected (CAN. ENT., XXV., 186) and also Dr. Strecker, Proc. Acad. Sci. Phila., p. 282). In view of these opinions, it seems probable that we were wrong, and I correct the synonymy below. In the same paper, Dr. Strecker describes as new *Hepialus los*. I cannot see in his description anything but a form of *argenteomaculatus*, wanting one of the basal silver spots and possessing some additional spots subapically, such as we often see in *quadriguttatus*. I have had in my collection for some years a specimen more extreme than this seems to be, for it has none of the silver spots, being otherwise normally marked. I would propose for it the name *perdita*.

Our species of *Hepialus* of large size, with the apices of primaries rectangular, may be arranged as follows, and the generic term *Stenopsis*, Pack, may be retained for them:—

S. ARGENTEOMACULATUS, Harris.

*argentatus*, Packard.

*alni*, Kellicott.

*var. purpurascens*, Packard.

*var. los*, Strecker.

*var. perditā*, Dyar.

*var. quadriguttatus*, Grote.

*semiauratus*, Neumoegen and Dyar.

*S. THULE*, Strecker.

*S. AURATUS*, Grote.

Dr. Strecker objects to the reference of *quadriguttatus* as a variety of *argenteomaculatus*, and would consider it a distinct species; but I am unable to find a good specific character. I should hesitate to rely on the colour alone in this genus, and have preferred to follow Prof. Smith's "List."

HARRISON G. DYAR.

ALEXICLES ASPERSA, Grote.

As pointed out by Prof. Smith, the original description of *Alexicles* is entirely inadequate. In fact, no characters are given which will determine its family position, the author going as far as to partially retract his own opinion as to its location. I have before me the type, very kindly forwarded to me for examination by Mr. W. A. Snow. It is a true Arctician apparently most nearly allied to *Leptarctia*. Head moderately prominent, tongue imperceptible; median spurs of hind tibiae wanting; anterior tibiae armed at tip with a stout, slightly curved spine or claw. ♂ frenulum a long spine, hooked into a loop on subcostal vein of primaries. Venation arctiiform; one internal vein on primaries, two on secondaries; median veins four-branched, normal; cells closed; vein 8 of secondaries from the subcostal more than one-third the length of cell from base. On primaries no accessory cell; veins 7-10 stalked; 8 and 9 forming a short furcation near apex of wing; 7 nearer the furcation and 10 rather near the cell, leaving a long stalk between their origins; vein 11 from the subcostal near end of cell; vein 12 from the base half way between the subcostal vein and costa.

Fore-wings narrow, costa straight, apex rounded; hind-wings oval.

It is scarcely necessary to add anything to Mr. Grote's description of the species. Though short, it is excellent, as are nearly all of Mr. Grote's specific descriptions. Mr. Grote gives the expanse as 32 mm.; but in the type, mounted as usual, the wings reach 36 mm.

HARRISON G. DYAR.

DR. HAGEN.

We deeply regret the loss of our old friend, Dr. Hermann August Hagen, Professor of Entomology in Harvard University, who died, after a long illness, at Cambridge, Mass., on the 9th of November, in the seventy-seventh year of his age.

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## ERRATA.

- Page 6, 3d line, for *P. tolteca* read *T. tolteca*.  
 Page 161 20th line, for "*Archilithabius*" read "*Archilithobius*."



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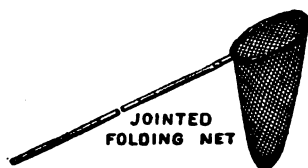
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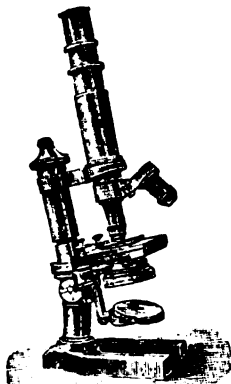
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